Operating and Service Manual

MODEL

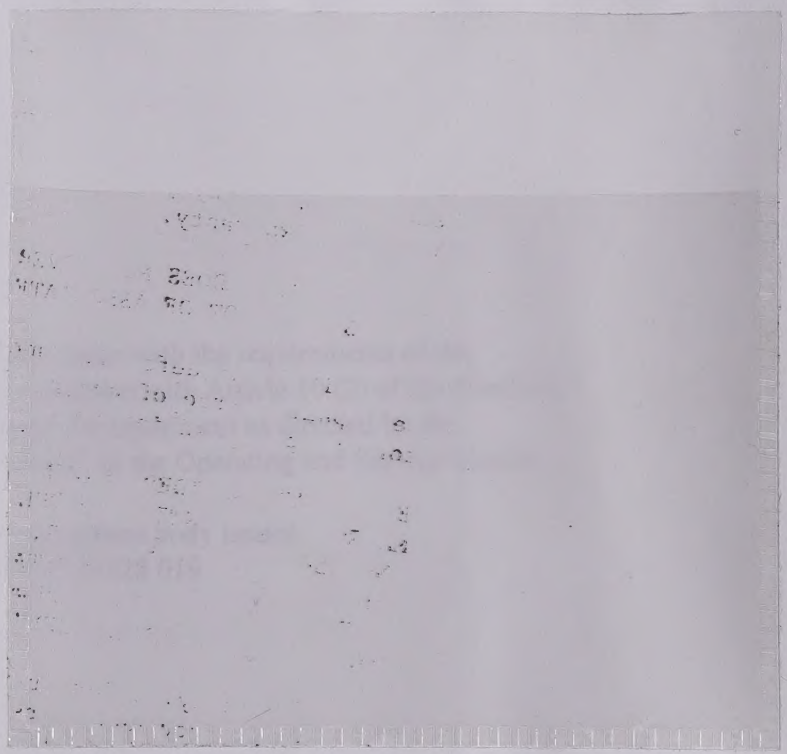
150A220

PART NUMBER

1006154-501

SERIAL NUMBER

18780



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EC Declaration of Conformity

We; Amplifier Research
160 School House Road
Souderton. Pa. 18964

declare that our product;

the Model 150A220 RF amplifier

to which this declaration relates is in compliance with the requirements of the;
EEC EMC Directive (89/336/EEC) in accordance with Article 10 (2) of the directive,
with the provision that the user must install the equipment as directed by the
"Instructions for European EMC Conformity" in the Operating and Service Manual.

This declaration is made on the basis of competent body issued
EC Certificate of Conformity No.: E9 96 02 25528 019.

Donald R. Shepherd
President

INSTRUCTIONS FOR SAFE OPERATION

BEFORE APPLYING POWER

Review this manual and become familiar with all safety markings and instructions.

Verify that the equipment line voltage selection is compatible with the main power source.

Protection provided by the equipment may be impaired if used in a manner not specified by Amplifier Research.

SAFETY SYMBOLS

This symbol is marked on the equipment when it is necessary for the user to refer to the manual for important safety information. This symbol is indicated in the Table of Contents to assist in locating pertinent information.

Dangerous voltages are present. Use extreme care.

CAUTION: The caution symbol denotes a potential hazard. Attention must be given to the statement to prevent damage, destruction or harm.

Indicates protective earth terminal.

SAFETY GROUND

This equipment is provided with a protective earth terminal. The main power source to the equipment must supply an uninterrupted safety ground to input wiring terminals, power cord, or supplied power cord set. The equipment **MUST NOT BE USED** if this protection is impaired.

CAUTION:

Adjustment, maintenance, or repair of the equipment must be performed only by qualified personnel.

Hazardous energy may be present while protective covers are removed from the equipment even if disconnected from the power source. Contact may result in personal injury.

Replacement fuses are required to be of specific type and current rating.

INSTRUCTIONS FOR SAFE OPERATION

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Instructions for European EMC Conformity

WARNING

It is the responsibility of the user of this equipment to provide electromagnetic shielding, filtering and isolation which is necessary for EMC compliance to Directive 89/336/EEC. The equipment must therefor be operated in a shielded area which provides a sufficient level of attenuation to meet the radiated emissions and immunity specifications. All AC, DC and Control lines connected to the equipment and entering or exiting the shielded area must have sufficient isolation to meet the conducted emissions and immunity specifications. The following minimum levels are suggested for use in accordance with the rated power of the equipment.

Rated Power	Minimum shielding attenuation	Minimum line isolation
100 watts	50 dB	50 dB
101 - 1000 watts	60 dB	60 dB
1001 - 10,000 watts	70 dB	70 dB

Since this equipment is designed to generate high levels of Radio Frequency energy, it is also essential that the user read and follow the "Instructions for Safe Operation" in this manual. If other equipment is operated in the shielded room it may be disturbed by the amplifier.

ACHTUNG

Der Benutzer dieses Gerätes ist dafür verantwortlich, daß die elektromagnetische Abschirmung und Filterung gewährleistet ist, welche gemäß Richtlinie 89/336/EEC notwendig ist. Das Gerät muß deshalb in einem geschirmten Raum betrieben werden, welcher eine ausreichenden Schirmung bietet, um die Emissions- und Störfestigkeitsspezifkation einzuhalten. Alle Wechsel- und Gleichspannungsleitungen sowie Steuerleitungen, die mit dem Gerät verbunden sind und in den geschirmten Raum von außen hereingeführt werden, müssen ausreichend gefiltert sein, um die Emissionsspezifkation einzuhalten. Es werden folgenden Minimalwerte der Schirmdämpfung und Filterung in den unterschiedlichen Leistungsklassen empfohlen.

Hochfrequenzleistung	min. Schirmdämpfung	min Filterdämpfung
100 Watt	50 dB	50 dB
101-1000 Watt	60 dB	60 dB
1001-10.000 Watt	70 dB	70 dB

Falls andere elektrische oder elektronische Geräte gleichzeitig mit dem Gerät betrieben werden, kann es zu Beeinflussungen kommen. Da das Gerät zur Erzeugung von Hochfrequenzenergie dient ist es daher auch unbedingt notwendig, daß der Benutzer die Sicherheitsvorschriften in der Bedienungsanleitung liest und einhält.

AVERTISSEMENT

Il est de la responsabilité de l'utilisateur de cet équipement d'assurer la protection électromagnétique, le filtrage et l'isolation nécessaires, afin de se conformer à la directive 89/336/EEC concernant la C.E.M. Par conséquent, cet équipement doit être mis en fonctionnement dans une enceinte d'atténuation suffisante pour satisfaire aux spécifications d'émissivité et de susceptibilité. Toutes les alimentations alternatives, continues ainsi que les liaisons de contrôle connectées à cet équipement, qui entrent ou sortent de cette enceinte doivent avoir une isolation suffisante pour satisfaire aux spécifications concernant les émissions conduites et d'immunité. Pour une utilisation conforme, les niveaux d'atténuation minimums suivants sont suggérés en fonction de la puissance de sortie de l'équipement:

Puissance de sortie	Atténuation minimum de l'enceinte	Isolation minium de la ligne
100 Watts	50 dB	50 dB
101 à 1.000 Watts	60 dB	60 dB
1.001 à 10.000 Watts	70 dB	70 dB

Puisque cet équipement est destiné à générer de forts niveaux R.F., il est essentiel que l'utilisateur se conforme aux instructions de sécurité indiquées dans ce manuel. Tout autre équipement en fonctionnement dans la cage de Faraday peut-être perturbé par l'amplificateur.

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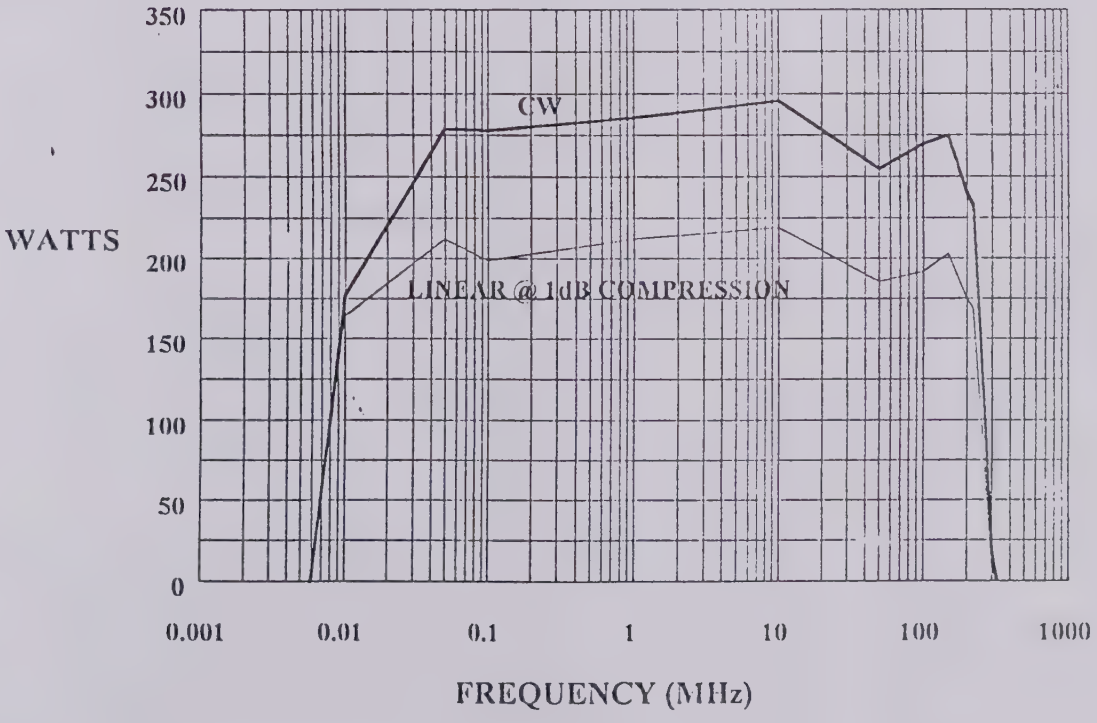
MODEL 150A220
150 WATTS CW
10 kHz - 220 MHz

The Model 150A220 is a completely solid-state, linear broadband amplifier for laboratory applications requiring instantaneous bandwidth, high gain and moderate power. Housed in a stylish laboratory type cabinet, the 150A220 incorporates the latest in MOSFET design, with complete thermal and over current protection and total mismatch tolerance. Computer control is available using the remote control capability provided by our CP2001 and CP3000 accessories.

150A220 TYPICAL POWER OUTPUT



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SECTION I

GENERAL INFORMATION

1.1 GENERAL DESCRIPTION

The Model 150A220 Amplifier is a self-contained broadband unit designed for laboratory applications where instantaneous bandwidth, high gain, and moderate power output are required. Solid state technology is used exclusively to offer significant advantages in reliability and cost. A valuable feature is the continuously variable attenuator which enables the operator to adjust the amplifier gain over an 18dB range to meet his specific requirements by means of a simple front panel control.

Typical applications include antenna and component testing, wattmeter calibration, EMI susceptibility testing, use as a driver for frequency multipliers and high power amplifiers and as an RF source for nuclear magnetic resonance imaging studies.

1.2 POWER SUPPLIES

This unit has two self-contained 120/240 VAC, 50/60Hz, regulated power supplies. The power consumption is a nominal 1500 watts. Primary circuit fusing including a main circuit breaker is provided.

1.3 SPECIFICATIONS

Refer to the *"Amplifier Research Data Sheet"* on the following page for detailed specifications.

SPECIFICATIONS

Model 150A220

POWER OUTPUT, CW	
Typical	200 watts
Minimum	150 watts
Linear @ 1dB compression	150 watts minimum
FLATNESS	±1.5 dB max.
FREQUENCY RESPONSE	10 KHz - 220 MHz instantaneously
INPUT FOR RATED OUTPUT	1.0 milliwatt maximum
GAIN (at maximum setting)	53 dB minimum
GAIN ADJUSTMENT (continuous range)	18 dB minimum
INPUT IMPEDANCE	50 ohms, VSWR 1.5:1 max.
OUTPUT IMPEDANCE	50 ohms, VSWR 2.5:1 max.
MISMATCH TOLERANCE	100%, will operate without damage, foldback, shutdown or oscillation with any magnitude and phase of source and load impedance at rated output power
MODULATION CAPABILITY	Will faithfully reproduce AM, FM, or pulse modulation appearing on the input signal
HARMONIC DISTORTION	Maximum at 150 watts output -20 dBc 10 kHz - 125 MHz -30 dBc 125 MHz - 220MHz
THIRD ORDER INTERCEPT POINT	60 dBm, typical
PRIMARY POWER (specify one)	100 - 120 and 200 - 240 VAC ±5% 50/60 Hz, single phase 1500 watts maximum
CONNECTORS	
RF input	Type BNC female
RF output	Type N female
Remote control	25 Pin subminiature D
COOLING	Forced Air (internal fans)
WEIGHT	47 kg (105 lbs)
SIZE (WxHxD)	50.7 x 34.0 x 55.0 cm (19.8 x 13.3 x 21.5 in)

1.4 INSTALLATION

Before proceeding, thoroughly inspect the amplifier for signs of physical damage which may have been incurred during shipment and completely read the following installation and operating instructions, paying special attention to all CAUTION notes.

1.4.1 Location

Select an operating location which will permit free air circulation around the amplifier cabinet. The Model 150A220 utilizes intensive air cooling and should not be located where the normal flow of air into or exiting from the unit will be restricted, diverted, or re-circulated through the unit itself.

CAUTION:

DO NOT LOCATE HEAT SENSITIVE EQUIPMENT OR BOOKS, PAPERS, AND OTHER TEMPERATURE SENSITIVE MATERIALS IN THE DIRECT PATH OF THE EXHAUST AIR.

1.4.2 Primary Power Connection

The Model 150A220 can be operated on 100/110/120 or 200/220/240 VAC, 50/60Hz primary power. The unit has been wired at the factory for the line voltage indicated on the rear chassis near the circuit breaker. The input line power must be connected to the two terminals on the circuit breaker A5CB1 and the safety ground is connected to the #10 Stud located by the circuit breaker, see *"Figure 4"*.

NOTE: Although some of the following setting can be checked/changed from the access hole in the rear of the unit,. the bottom cover must be removed to check/change the jumper setting s on the switching power supply. ***Be sure to check all 3 settings****. Failure to follow the instructions carefully could result in damage to the unit* ***which will not be covered under warranty****.*

For 100/110/120 VAC operation:

1. The voltage select switch A3S1 is placed in the 115 volt position.
2. A jumper is connected between terminals 1 & 2 on the voltage selection terminal block of the switching power supply A3PS1.
3. The jumpers on A3P1 are selected for 100, 110 or 120 VAC operation. See *"Plug Connections for Voltage Selection"* and Schematic Diagram Number 1005795, *"Control Circuit Assembly"*.

For 200/220/240 VAC operation:

1. The voltage select switch A3S1 is placed in the 230 volt position.
2. The voltage selection terminal block of the switching power supply A3PS1 should not have any jumpers connected to it. Specifically there should not be a jumper connected between terminals 1 & 2. *If the unit is powered up with 200/220//240 VAC applied and the jumper between terminals 1& 2 is not removed,* ***severe damage to the switching power supply will occur.***
3. The jumpers on A3P1 are selected for 200, 220 or 240 VAC operation. See *"Plug Connections for Voltage Selection"* and Schematic Diagram Number 1005795, *"Control Circuit Assembly"*.

CAUTION:

WHEN CHANGING PRIMARY VOLTAGES USE NO LESS THAN 14 GAUGE LINE CORD. USE OF INCORRECT LINE CORD FOR PRIMARY VOLTAGE WILL CAUSE EXTENSIVE DAMAGE.

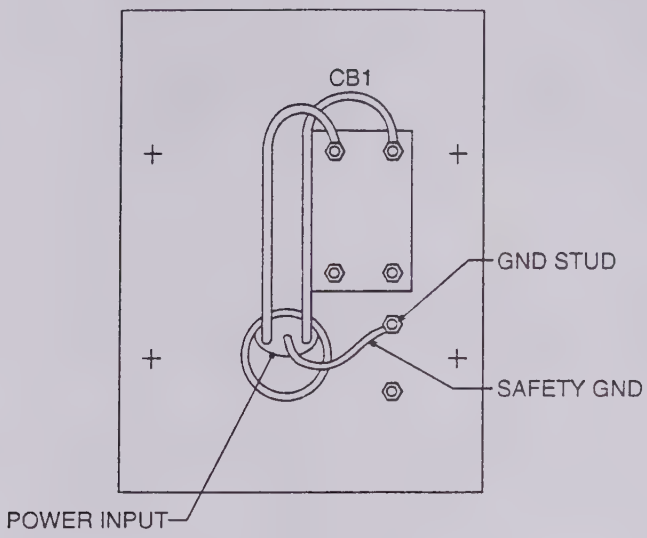
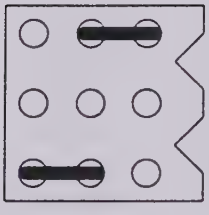


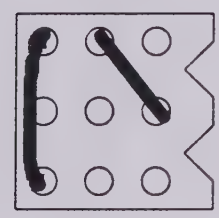
FIGURE 4



JUMPERS:

PINS 1 & 4
PINS 6 & 9

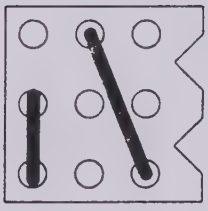
120/240 VOLTS



JUMPERS:

PINS 2 & 4
PINS 7 & 9

110/220 VOLTS



JUMPERS:

PINS 3 & 4
PINS 8 & 9

100/200 VOLTS

"PLUG CONNECTIONS FOR VOLTAGE SELECTION"

1.4.3 General CAUTION Notes

The Model 150A220 Power Amplifier uses a high current DC power supply. This high current capability is extremely dangerous. Service should be performed only by personnel thoroughly familiar with the hazards inherent to this type of equipment.

The Model 150A220 Power Amplifier is also capable of producing output voltages which are capable of causing serious RF burns if contact is made with the output. **ALWAYS** turn the amplifier OFF when connecting or disconnecting cables. The amplifier is designed to withstand severely mismatched loads and will not shutdown or be harmed even by loads which may be encountered when the output cable is removed. However, the operator may possibly be burned or injured.

SECTION II

OPERATING INSTRUCTIONS

2.1 GENERAL

Operation of the Model 150A220 broadband amplifier is quite simple. The input signal, whether swept or fixed in frequency, is fed into the jack marked *"INPUT"* and the amplifier output signal is taken from the jack labeled *"OUTPUT"*. The unit is turned on by activating the key switch and the push button switch marked *"POWER"*. The unit is placed in the operate mode by depressing the push button switch marked *"OPERATE"*.

In the event of a unit malfunction, protection is provided by fusing located at the rear of the unit. A polarized, three (3) wire AC power cord must be connected to the unit to provide cabinet and chassis grounding to the power mains.

CAUTION:

THE MODEL 150A220 AMPLIFIER IS NOT CRITICAL IN REGARDS TO SOURCE AND LOAD VSWR AND WILL REMAIN UNCONDITIONALLY STABLE WITH ANY MAGNITUDE AND PHASE OF SOURCE AND LOAD VSWR. IT ALSO HAS BEEN DESIGNED TO WITHSTAND, WITHOUT DAMAGE, RF INPUT POWER UP TO TWENTY (20) TIMES ITS RATED INPUT OF 1mW. HOWEVER, SIGNAL LEVELS HIGHER THAN 20mW OR TRANSIENTS WITH HIGH PEAK VOLTAGES CAN DAMAGE THE AMPLIFIER. ALSO, ACCIDENTAL CONNECTIONS OF THE OUTPUT TO ITS INPUT CAUSES OSCILLATIONS WHICH WILL PERMANENTLY DAMAGE THE INPUT TRANSISTOR.

WHILE THE MODEL 150A220 WILL OPERATE AT ITS RATED OUTPUT POWER INTO ANY LOAD IMPEDANCE, THE AMPLIFIER MAY BE DAMAGED IF IT IS SIMULTANEOUSLY OVERDRIVEN WITH AN OPEN OR SHORT CIRCUITED LOAD. TO PREVENT DAMAGE TO THE AMPLIFIER, THE FOLLOWING PRACTICES ARE RECOMMENDED:

1) **DO NOT INTENTIONALLY OVERDRIVE THE AMPLIFIER AT ANY TIME. WHEN OPERATING INTO A MISMATCHED LOAD, TAKE SPECIAL PRECAUTIONS SO THAT THE INPUT CANNOT BE INADVERTENTLY OVERDRIVEN.**

2) **WHEN CONNECTING AND DISCONNECTING CABLES, TURN THE POWER SWITCH OFF. CARE MUST BE TAKEN TO PREVENT RESTRICTIONS OF THE COOLING FAN AIR INLET OPENING ON THE BOTTOM OF THE UNIT. RESTRICTION OF THE OPENING FOR EXTENDED PERIODS WILL CAUSE OVERHEATING OF THE UNIT AND POSSIBLE PREMATURE FAILURE. 150 WATTS OF RF POWER IS SUFFICIENT TO CAUSE SERIOUS ELECTRICAL SHOCK AND/OR RF BURNS. CONNECT AND HANDLE OUTPUT WITH CAUTION.**

2.2 AMPLIFIER OPERATION

Figure 2.1 shows the Model 150A220 Amplifier in pictorial form.

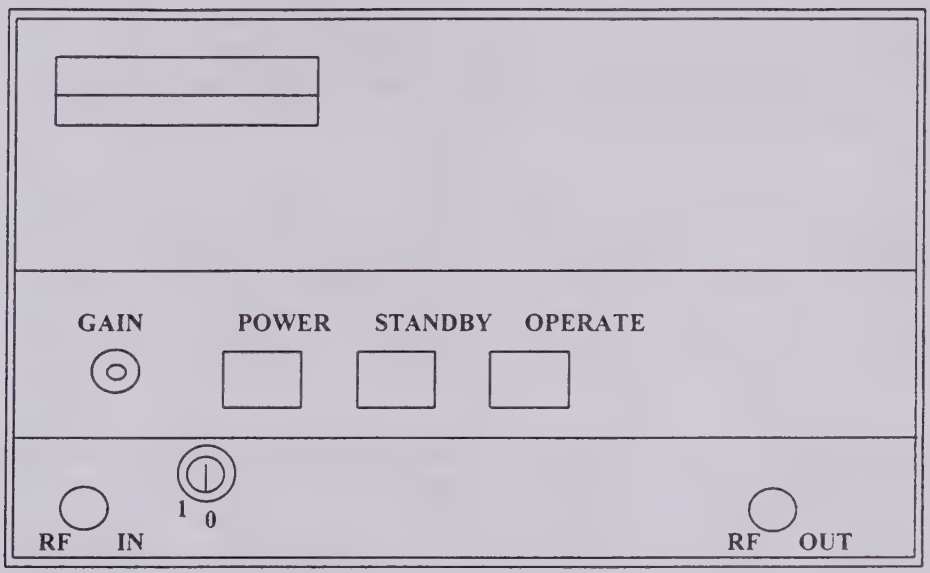


FIGURE 2.1 "AMPLIFIER OPERATION"

TURN ON SEQUENCE:

1. Connect input signal to *"INPUT"* connector.

2. Connect load to *"OUTPUT"* connector.

3. Activate the key switch by rotating CW. Depress the *"POWER"* button. This will place the unit in the *"STANDBY"* condition. Depressing the *"OPERATE"* switch will place the unit in the *"OPERATE"* condition. Depressing the *"STANDBY"* switch places the unit back to the *"STANDBY"* condition. In standby the cooling fans will continue to run but no voltage is applied to the RF circuits.

SECTION III

THEORY OF OPERATION

3.1 INTRODUCTION

The Model 150A220 amplifier consists essentially of two (2) power supplies with control circuitry, a driver amplifier assembly, and four (4) identical power amplifier assemblies. The majority of the RF related components are located on a single heat sink assembly. The power supplies and control circuits are located below the heat sink assembly.

The larger power supply is a self-contained switching power supply. This supply, A3PS1, supplies the four (4) regulator assemblies, A3A2, A3A3, A3A4, A3A5, and the driver amplifier, A2A1. The four (4) regulator assemblies in turn supply the four (4) final amplifier assemblies, A2A2, A2A3, A2A4, and A2A5.

The smaller supply consists of transformer A3T1 and regulator board A3A1. This supply feeds 24 volts to the fans and to the control relays.

The driver amplifier A2A1 consists of three (3) gain stages. The first two stages are common source amplifiers, biased in the class "A" linear region. The third stage consists of a linear push-pull stage whose output is transformer coupled to the four (4) way splitter A2A6, which supplies the drive signals to the four (4) power amplifier assemblies, A2A2, A2A3, A2A4, and A2A5.

Each of the four (4) power amplifiers consists of a linear push-pull output stage, which is transformer coupled to the four (4) way output combiner, A2A7.

3.2 AMPLIFIER SECTION

3.2.1 Driver Amplifier

Refer to Block Diagram Number 1005706, *"Block Diagram 150A220"*, Drawing Number 1005724, *"RF Assembly"*, and Schematic Diagram Number 1006102, *"RF Driver"*.

The input signal to the amplifier is fed through the front panel attenuator A1A1 to the RF Assembly. The attenuator is a connectorized unit which controls the gain of the amplifier. The signal from the attenuator is fed to the driver amplifier A2A1. The input signal to the A2A1 is limited by diodes CR1 and CR2. This signal drives Q1, whose bias current is set by R1. This stage of gain is followed by an equalizer which consists of C10, R5, R6, R7, and L4. This circuit adjusts the gain of the amplifier versus frequency for over all flatness of the amplifier frequency response. This is followed by Q2 whose bias is set by R9.

3.2.1 Driver Amplifier (Continued)

The third stage consists of Q3 and Q4 in a push-pull arrangement and the associated input and output transformers and bias circuitry. The amplifier bias is adjusted by R17 and the bias currents are balanced by R21. The output of Q3 and Q4 is transformer coupled to the four (4) way splitter A2A6. Bias voltages for the driver amplifier are regulated by U3. The drain supply voltages are regulated by U1 and U2. Intra-stage feedback is used on the individual stages to stabilize operation and flatten the frequency response.

3.2.2 Final RF Amp

Refer to Block Diagram Number 1005706, *"Block Diagram 150A220"*, Drawing Number 1005724, *"RF Assembly"* and Schematic Diagram Number 1005598, *"RF Amp"*.

The four (4) way splitter A2A6 provides four (4) equal signals which are fed to the four (4) identical output stages A2A2, A2A3, A2A4, and A2A5. Only one stage will be discussed.

Transformers T2, T3, and T4 provide impedance matching between the splitter A2A6 and the gates of Q1 and Q2. The bias for Q1 and Q2 is regulated by U1. The bias level is adjusted by R4 and the balance between Q1 and Q2 is adjusted by R8. Feedback from drain to gate is used to flatten response and stabilize operation. The output of Q1 and Q2 is transformer coupled through T5, T6, and T7 to the four (4) way combiner A2A7 where the four (4) signals are combined and fed to the output connector. Each of the four (4) output stages is supplied by its own regulator and is protected by its own fuse.

3.3 POWER SUPPLY SECTION

Refer to Schematic Diagram Number 1005795, *"Control Circuit Assembly"*.

The Model 150A220 has two (2) independent power supplies. The first consists of a switching power supply A3PS1 and four (4) regulator boards A3A2, A3A3, A3A4, and A3A5. This supply feeds the four (4) power stages A2A2, A2A3, A2A4, A2A5, and the driver stage A2A1.

The second supply consists of transformer A3T1 and regulator board A3A1. This supply feeds the three (3) fans and the control circuits.

CAUTION:

WHEN CHANGING PRIMARY VOLTAGE, THE VOLTAGE SELECT SWITCH, FOUND INSIDE THE UNIT AND THE VOLTAGE SELECT SWITCH FOUND ON THE SWITCHING POWER SUPPLY MUST BE PLACED IN THE CORRECT POSITION AND THE CORRECT VOLTAGE SELECT PLUG A3P1 MUST BE INSTALLED.

3.3.1 Power Supply for RF Circuits

Refer to Schematic Diagram Number 1005795, *"Control Circuit Assembly"*.

Input AC power is fed through the circuit breaker A5CB1, contactor A3K1, and line filter A3FL1 to the switching power supply A3PS1. Although primary power is present at the switching power supply, there is no output until it is activated by the *"OPERATE"* command from A3A6K6. When the switching power supply is activated a nominal 35 volts DC is supplied through five (5) fuses, A5F1, A5F2, A5F3, A5F4, and A5F6 to the driver amplifier A2A1 and to the four (4) regulator boards A3A2, A3A3, A3A4, and A3A5.

3.3.1.1 Regulator Assembly

Refer to Schematic Diagram Number 1005613, *"Regulator"*.

A nominal 35 volts DC is supplied by the switching power supply to the regulator assemblies. The regulator assembly consists of a darlington series pass transistor Q1, an integrated circuit voltage regulator U1 and the associated circuitry. The output is adjusted to a nominal 29 volts DC by R5. The output is current limited and is adjusted to a nominal 6 amps by R8. U1 also contains thermal shutdown and input overvoltage protection.

3.3.2 Power Supply for Control Circuits (+24 Volts)

Refer to Schematic Diagram Number 1005795, *"Control Circuit Assembly"*.

Input AC power is fed through the circuit breaker A5CB1, fuse A5F5, and voltage select switch A3S1 to transformer A3T1. The secondary voltage from A3T1 is fed through contactor A3K2 to the regulator board A3A1. The contactor A3K2 is energized by turning the key switch A1S1 clockwise.

3.3.2.1 Regulator Assembly A3A1

Refer to Schematic Diagram Number 1005781, *"24V DC Power Supply"*.

The secondary voltage from A3T1 is rectified by CR1 and filtered by C1. The regulated output is provided by the darlington series pass transistor Q1 and the zener diodes VR1 and VR2.

3.4 CONTROL CIRCUITRY

Refer to Schematic Diagram Number 1005795, *"Control Circuit Assembly"* and Schematic Diagram Number 1005793, *"Operate Circuit"*.

3.4.1 Local Operation

Input AC power is fed through circuit breaker A5CB1 to contactor A3K1 which is de-energized at this time. The input AC power is also fed through fuse A5F5, and voltage select switch A3S1 to transformer A3T1. The transformer secondary voltage is fed to contactor A3K2, which is also de-energized at this time, and to the key switch A1S1. The key switch serves as a safety interlock. When the key switch is turned on, secondary voltage from the transformer energizes the contactor A3K2. Secondary voltage from the transformer is then fed to the regulator board A3A1. The regulator board then feeds 24 volts DC through the contacts of remote power relay A3A6K1 to the *"POWER"* switch A1S2. When the *"POWER"* switch is depressed, 24 volts is fed to several places. First, it is fed to contactor A3K1. The contactor is energized feeding input AC power to the input of the switching power supply A3PS1. However, the switching supply is still not turned on at this point. The 24 volts is also fed to the three (3) cooling fans A4B1, A4B2, and A4B3, and to the *"POWER"* indicator lamp. Third, the 24 volts DC is fed through the A3A1 interlock, the A3A6 interlock, the A4 interlock, the two (2) thermal switches A2S1 and A2S2, the remote operate relay A3A6K5, to the interlock relay A3A6K3. With A3A6K3 energized 24 volts DC is fed to the *"STANDBY"* indicator, and to the *"OPERATE"* switch A1S4. At this point, the unit is in the *"STANDBY"* mode. The *"POWER"* and *"STANDBY"* indicators should be lit, and the cooling fans should be running. Depressing the *"OPERATE"* switch A1S4 feeds 24 volts DC through the *"STANDBY"* switch A1S3 to the *"OPERATE"* indicator and to *"OPERATE"* relay A3A6K6. Energizing A3A6K6 turns on the switching power supply A3PS1, which supplies the power for the RF circuits. A3A6K6 also supplies 24 volts DC through the remote operate relay A3A6K5 and the *"STANDBY"* switch A1S3 back to the coil of A3A6K6. This latches A3A6K6 in the energized condition. The unit is now in the *"OPERATE"* mode. Depressing the *"STANDBY"* switch removes 24 volts DC from A3A6K6 placing the unit back in the *"STANDBY"* mode.

3.4.2 Remote Operation

For remote operation the remote control unit CP2001 must be connected to the remote connector on the rear panel.

In remote operation the key switch must be in the on position, and the *"POWER"* switch must be off. With the remote control unit connected and the key switch *"ON"*, 24 volts is fed to the remote *"POWER"* switch. When the remote *"POWER"* switch is turned on the 24 volts is fed to the remote power relay A3A6K1. This energizes the relay and feeds 24 volts through the power switch A1S2 which energizes A3K1 supplying line voltage to the switching power supply. This voltage also supplies the fans, the power lamp, the remote power lamp, and energizes the remote operate relay A3A6K5. The 24 volt interlock voltage is fed through the A3A1, A3A6, A4 interlocks and the A2S1 and A2S2 thermal switches to the interlock relay A3A6K3. With A3A6K3 energized 24 volts is supplied to the *"STANDBY"* lamp and the remote *"STANDBY"* lamp. Depressing the remote *"OPERATE"* switch feeds the 24 volts through the remote *"STANDBY"* switch, through the *"STANDBY"* switch to the operate relay A3A6K6. This energizes A3A6K6 and also lights the *"OPERATE"* and remote *"OPERATE"* lamps. 24 volts is fed through the energized contacts of A3A6K6 to latch the relay in the energized position. When A3A6K6 energizes it also removes ground from PS1 enable line allowing PS1 to turn on supplying 35 volts DC to the RF circuits. Depressing the remote standby switch removes 24 volts from A3A6K6 and places the unit in standby mode.

SECTION IV

MAINTENANCE

4.1 GENERAL MAINTENANCE INFORMATION

The Model 150A220 should require very little maintenance since it is a relatively simple instrument. It is built with etched circuit wiring and solid state devices which should ensure long, trouble-free life. However, should trouble occur, special care must be taken in servicing to avoid damage to the devices or the etched circuits boards.

Since the components are soldered in place, substitution of components should not be resorted to unless there is some indication that they are faulty. In addition, take care when troubleshooting not to short voltages across the amplifier. Small bias changes may ruin the amplifier due to excessive dissipation or transients.

Components within Amplifier Research instruments are conservatively operated to provide maximum instrument reliability. In spite of this, parts within an instrument may fail. Usually, the instrument must be immediately repaired with a minimum of *"down time"*. A systematic approach can greatly simplify and thereby speed up the repair.

However, due to the importance of the amplifier's alignment, it is recommended that when failure is caused by breakdown of any of the components in the signal circuits, the amplifier be returned to the factory for part replacement and amplifier realignment. Shipping instructions are as follows.

Ship PREPAID via Common Carrier to:

AMPLIFIER RESEARCH CORPORATION
160 SCHOOL HOUSE ROAD
SOUDERTON, PA 18964

4.2 DISASSEMBLY PROCEDURE

The Model 150A220 Amplifier consists of an RF assembly and a power supply/control assembly.

CAUTION:

REMOVE POWER CORD FROM THE POWER LINE BEFORE SERVICING.

4.2.1 To Remove Unit From Case

1. Remove four (4) front panel screws.
2. Slide unit forward out of case.

4.2.2 To Remove RF Assembly

1. Remove top cover.
2. Remove four (4) screws that hold RF output connector to front panel.
3. Remove connector from input level control.
4. Disconnect cable at left rear corner of heat sink assembly.
5. Remove five (5) screws along each side of heat sink assembly.
6. Remove three (3) screws that attach rear panel to heat sink assembly.
7. Raise heat sink assembly out through top of case far enough to disconnect cables going to fans. Then remove assembly remainder of the way out.

4.2.3 For Access To Power Supply Assembly

1. Remove bottom cover.

4.3 TROUBLESHOOTING

Before disassembling the unit, it would be advisable to check the circuit breaker and the six (6) fuses on the rear panel, since all that may be required is to replace a blown fuse. Also since each module has its own fuse, a blown fuse will give an indication as to which module has a problem.

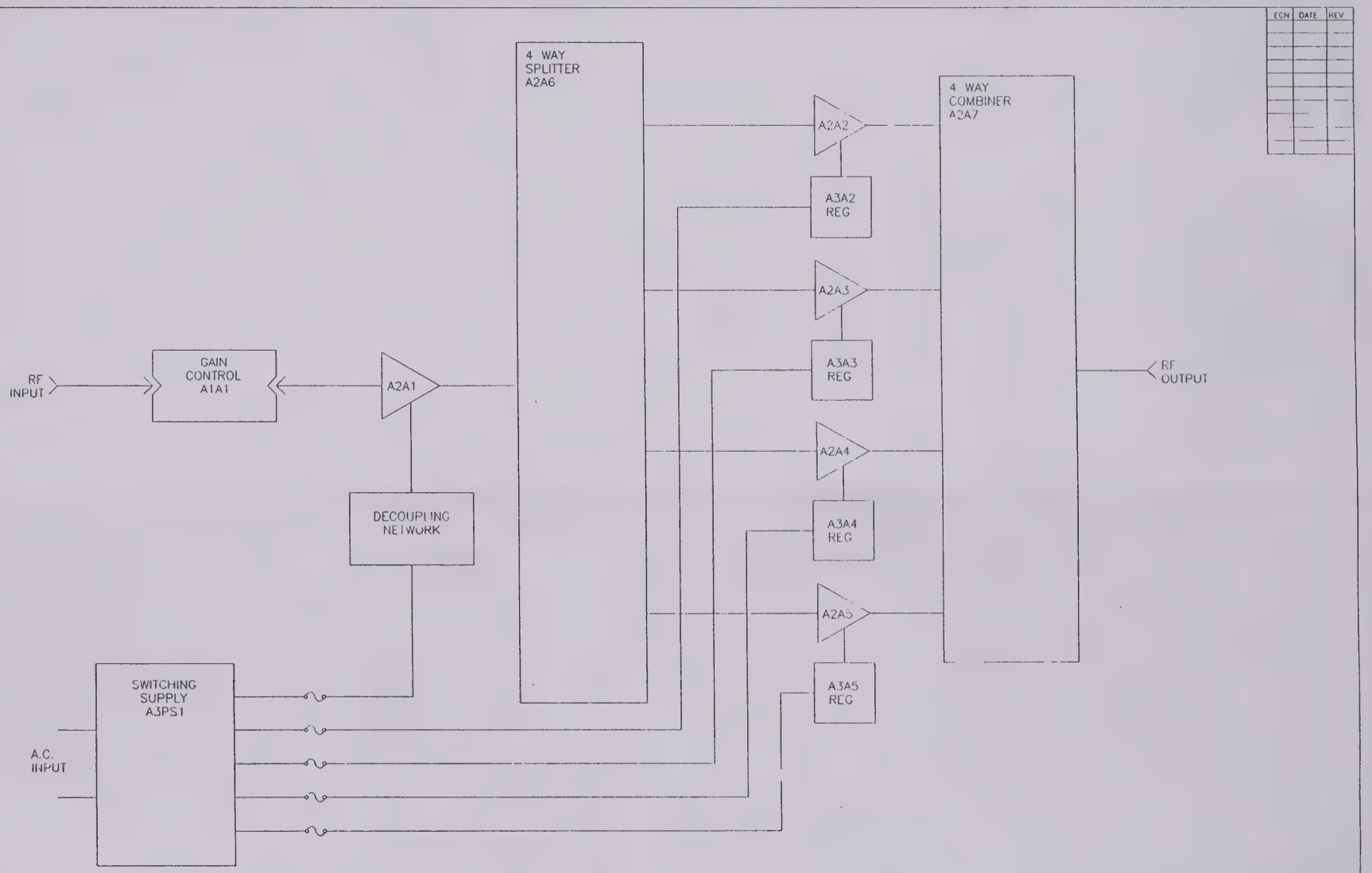
A possible next step would be to check the voltages on the individual modules. The voltage on the driver module is nominally +35 VDC. The voltage on the final modules is nominally +29 VDC. Voltages lower than this could indicate a bad regulator or a module drawing enough current to put the regulator into a current limit condition.

Except for the first stage the transistors are biased for a quiescent drain current of 800 milliamps per device in the driver amp and 2.5 amps per device in the final amps. This can be measured across the 0.1 ohm resistor in each drain circuit.

Beyond these procedures signal tracing techniques may have to be resorted to.

4.4 SERVICING ETCHED CIRCUIT BOARDS

When soldering leads, use a hot forty (40) watt or smaller iron. Apply heat sparingly to the leads, not to the printed wiring on the board. Before installing new parts, clean holes to receive new part without forcing. Have new leads tinned to receive solder quickly with a minimum of heat and without residue.



ECN	DATE	REV

ITEM	PART NO.	DESCRIPTION	MARK	FIN	MATL
QTY. REQD.	PARTS LIST				

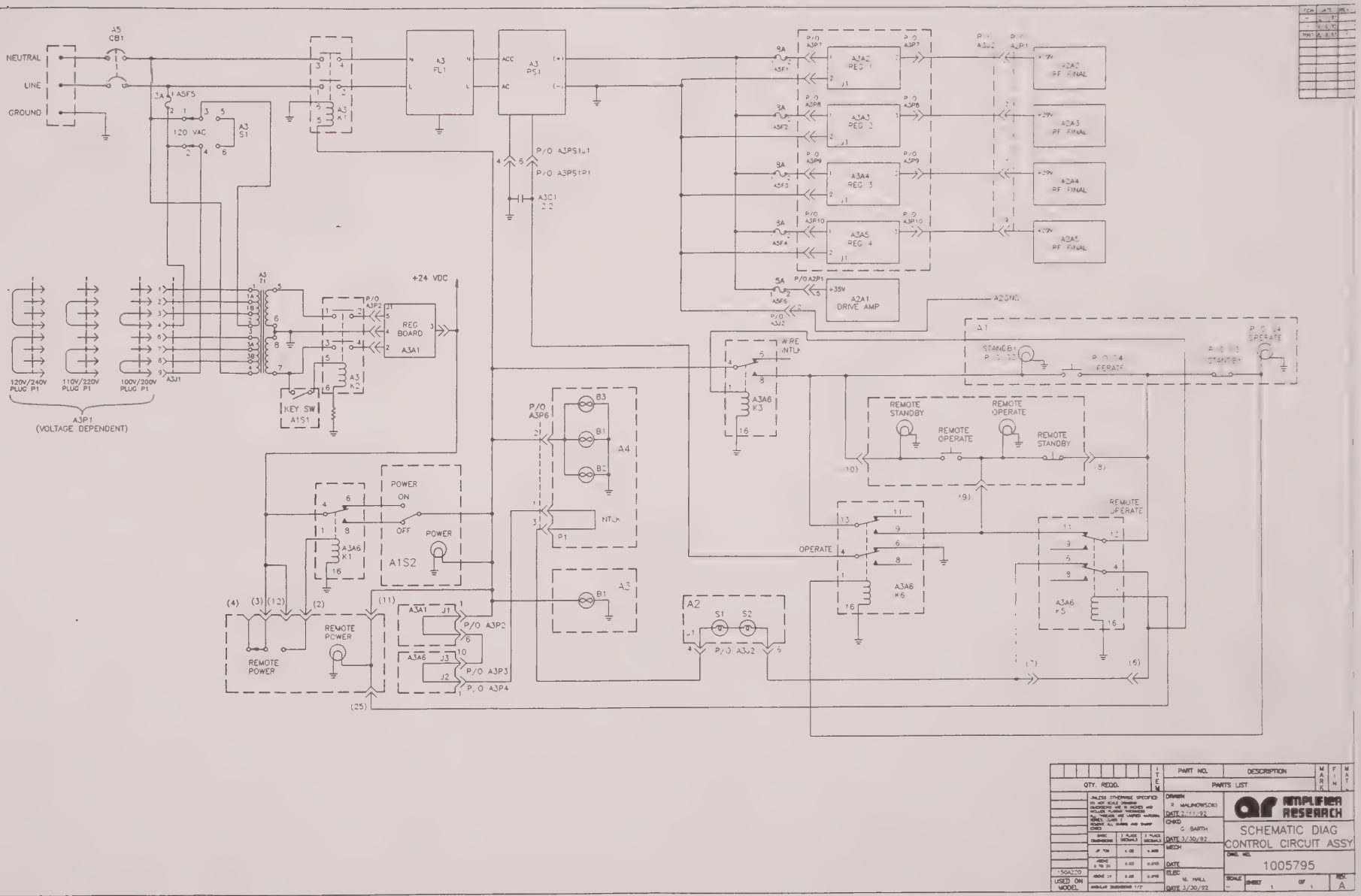
DRAWN
R. MALINOWSKI
DATE SEPT 21,1992
CHKD
DATE
MECH
DATE
ELEC
DATE

150A220
USED ON
MODEL

BLOCK DIAGRAM
150A220

DWG. NO.
1005706

SCALE 1/1 | SHEET 1 OF 1 | REV —



QTY. REQD.	ITEM	PART NO.	DESCRIPTION	MARK	FIND	MAT
		PARTS LIST				

UNLESS OTHERWISE SPECIFIED DO NOT SCALE DRAWING DIMENSIONS ARE IN INCHES AND INCLUDE PLATING THICKNESS ALL THREADS ARE UNIFIED NATIONAL SERIES, CLASS 3 REMOVE ALL BURRS AND SHARP EDGES

BASIC DIMENSIONS	2 PLACE DECIMALS	3 PLACE DECIMALS
.XX TOL	± .02	± .005
ANGLES ± 30'	0.02	0.010
ANGLES ± 1°	0.05	0.010

ANGULAR TOLERANCES ± 1/2°

150A200 USED ON MODEL

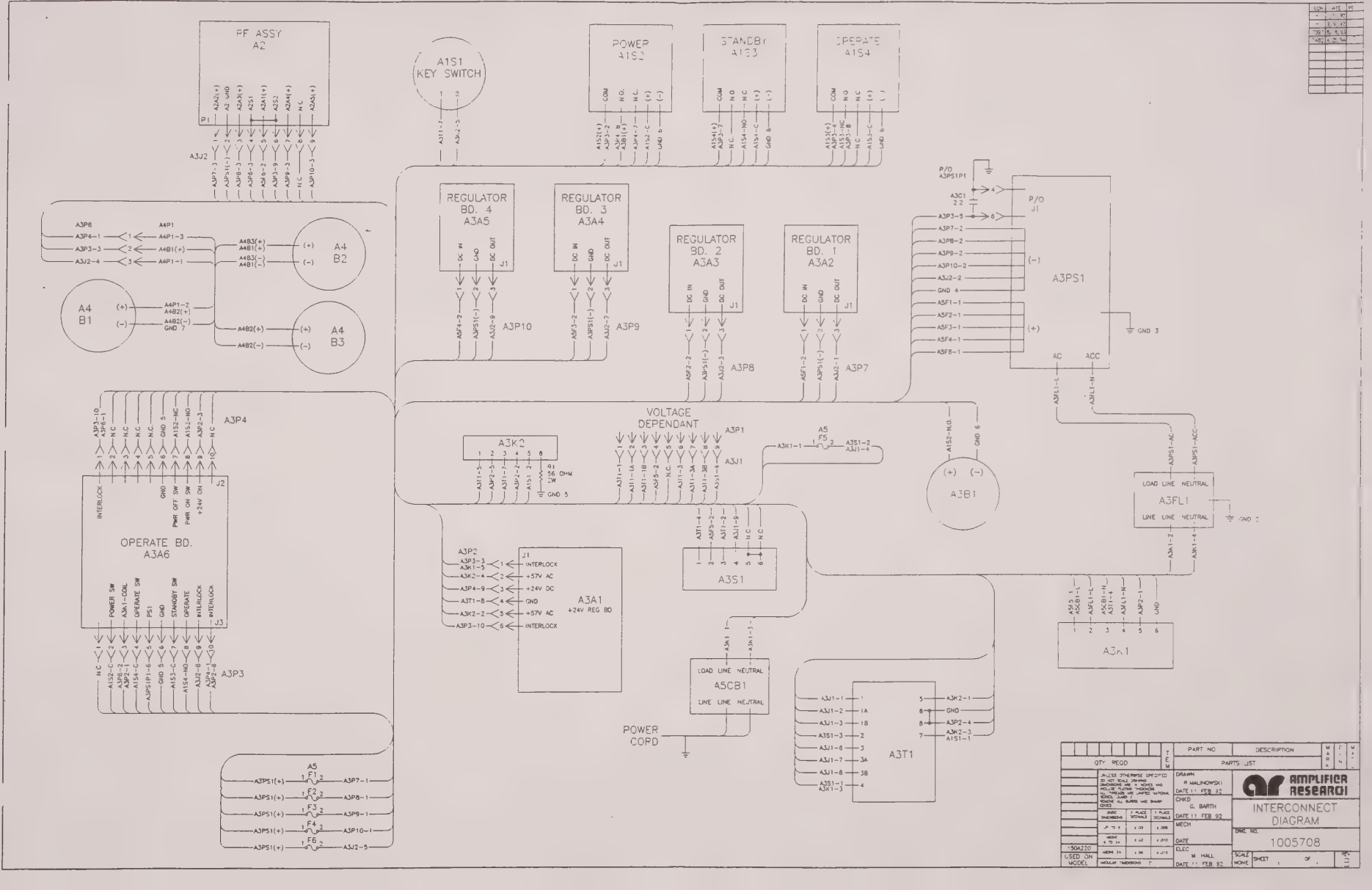
DRAWN R. MALINOWSKI DATE 3/30/92
CHKD G. BARTH DATE 3/30/92
MECH DATE
ELEC M. HALL DATE 3/30/92

AMPLIFIER RESEARCH

SCHEMATIC DIAG
CONTROL CIRCUIT ASSY

DWG. NO. 1005795

SCALE - SHEET 1 OF 1 REV. A



QTY REQD	ITEM	PART NO	DESCRIPTION	MADE X
			PARTS LIST	

UNLESS OTHERWISE SPECIFIED DO NOT SCALE DRAWING DIMENSIONS ARE IN INCHES AND INCLUDE PLATING THICKNESS ALL TOLERANCES ARE LIMITED NATIONAL STANDARD SURFACE FINISHES ALL BURRS AND SHARP EDGES

	1 PLACE DECIMAL	2 PLACE DECIMAL
ANGULAR ± 1°	± .03	± .005
MACH ± 10	± .03	± .010
MACH ± 5	± .06	± .015

MATERIAL TOLERANCES ±

1504220
USED ON MODEL

DRAWN R MALINOWSKI DATE 11 FEB 92
CHKD G. BARTH DATE 11 FEB 92
MECH DATE
ELEC M HALL DATE 11 FEB 92

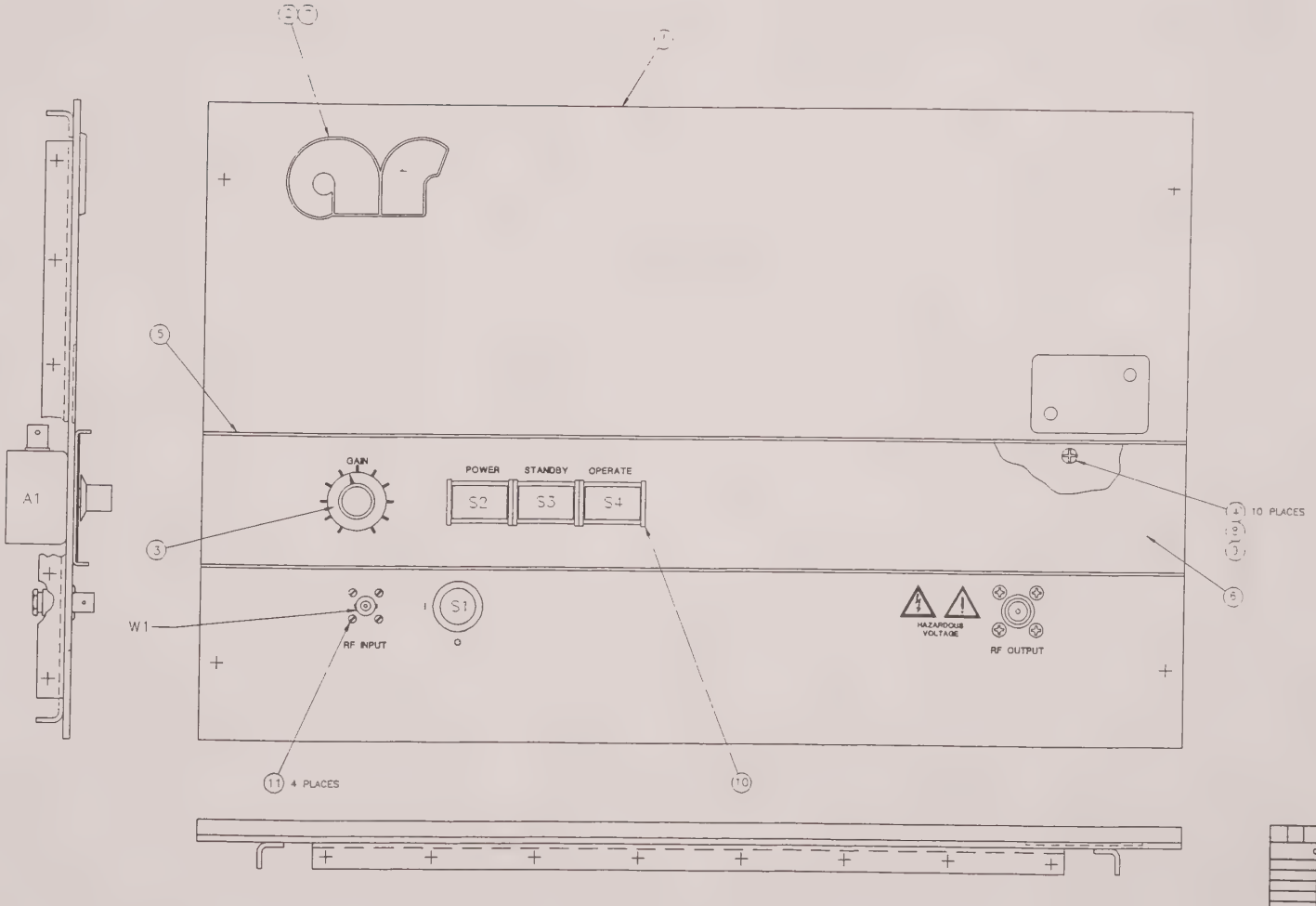
AMPLIFIER RESEARCH

INTERCONNECT DIAGRAM

DWG NO. 1005708

SCALE NONE SHEET 1 OF 1 REV

ECN	ATE	DE
-	1.92	
-	3.9.92	
729	5.5.93	
1485	6.25.96	



FOR BOM SEE 1005709-501

ITEM	QTY. REQD.	PART NO.	DESCRIPTION	MARK	FIND
		PARTS LIST			

UNLESS OTHERWISE SPECIFIED DO NOT SCALE DRAWING. DIMENSIONS ARE IN INCHES AND INCLUDE PLATING THICKNESS. ALL THREADS ARE UNIFIED NATIONAL SERIES, CLASS 2 UNLESS. ALL BURRS AND SHARP EDGES

BASIC DIMENSIONS	1 PLACE DECIMAL	2 PLACE DECIMAL
UP TO 6	± .02	± .008
OVER 6 TO 24	± .03	± .015
ABOVE 24	± .05	± .015

ANGULAR DIMENSIONS ± 1°

DRAWN	R MALINOWSKI
DATE	5/21/92
CHKD	J. BARTH
DATE	5/21/92
MFTG	R LUBRANO
DATE	5/21/92
ELEC	W WOLFGANG
DATE	10/5/92

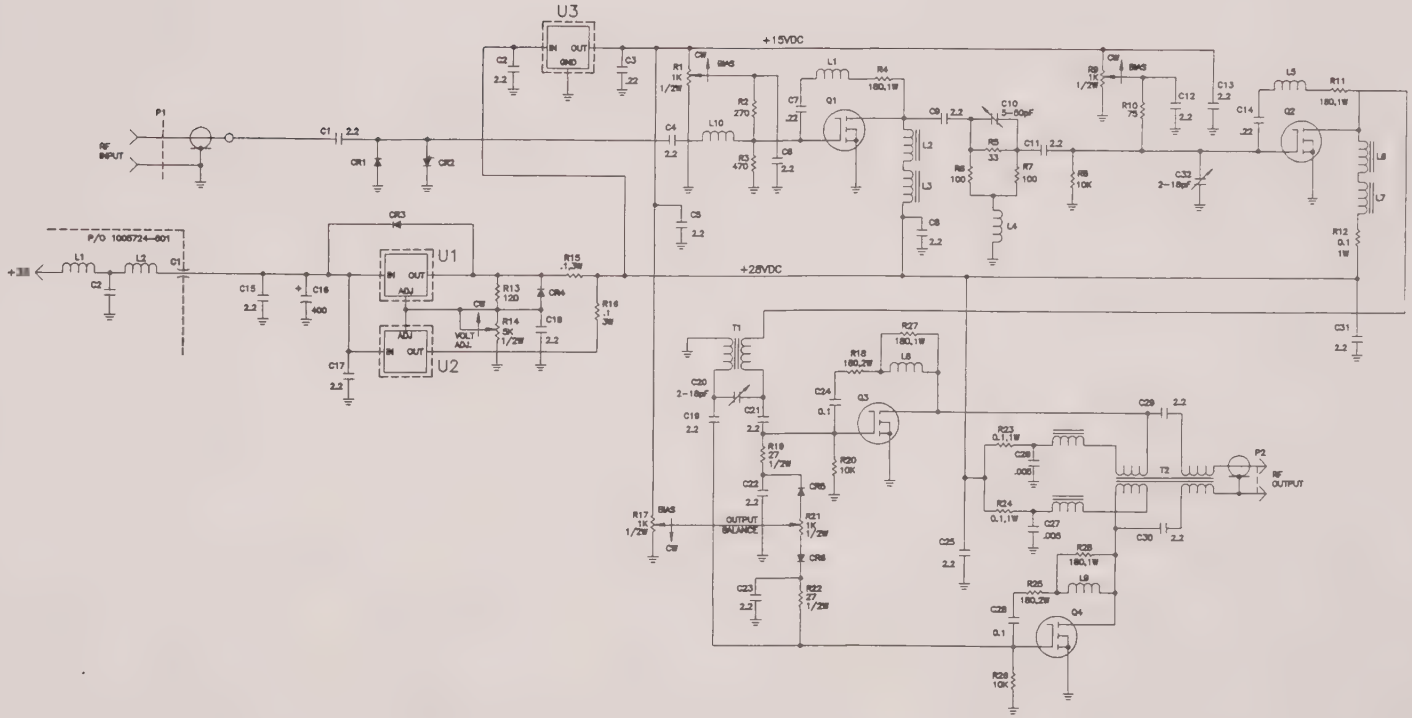
AMPLIFIER RESEARCH

CONTROL PANEL ASSY

DWG. NO. 1005709

SCALE 1:1 SHEET 1 OF 1 REV D

USED ON 50A200 MODEL



NOTES:
1. UNLESS OTHERWISE SPECIFIED:
   RESISTOR VALUES ARE OHMS
   RESISTOR WATTAGE ARE 1/4 WATT
   CAPACITOR VALUES ARE MICROFARADS

REFERENCE DESIGNATIONS

LAST USED	NOT USED
C30	
CR6	
L10	
Q4	
R26	
T2	
U3	

QTY. REQD.	ITEM	PART NO.	DESCRIPTION	MARK	FIN	MATL
		PARTS LIST				

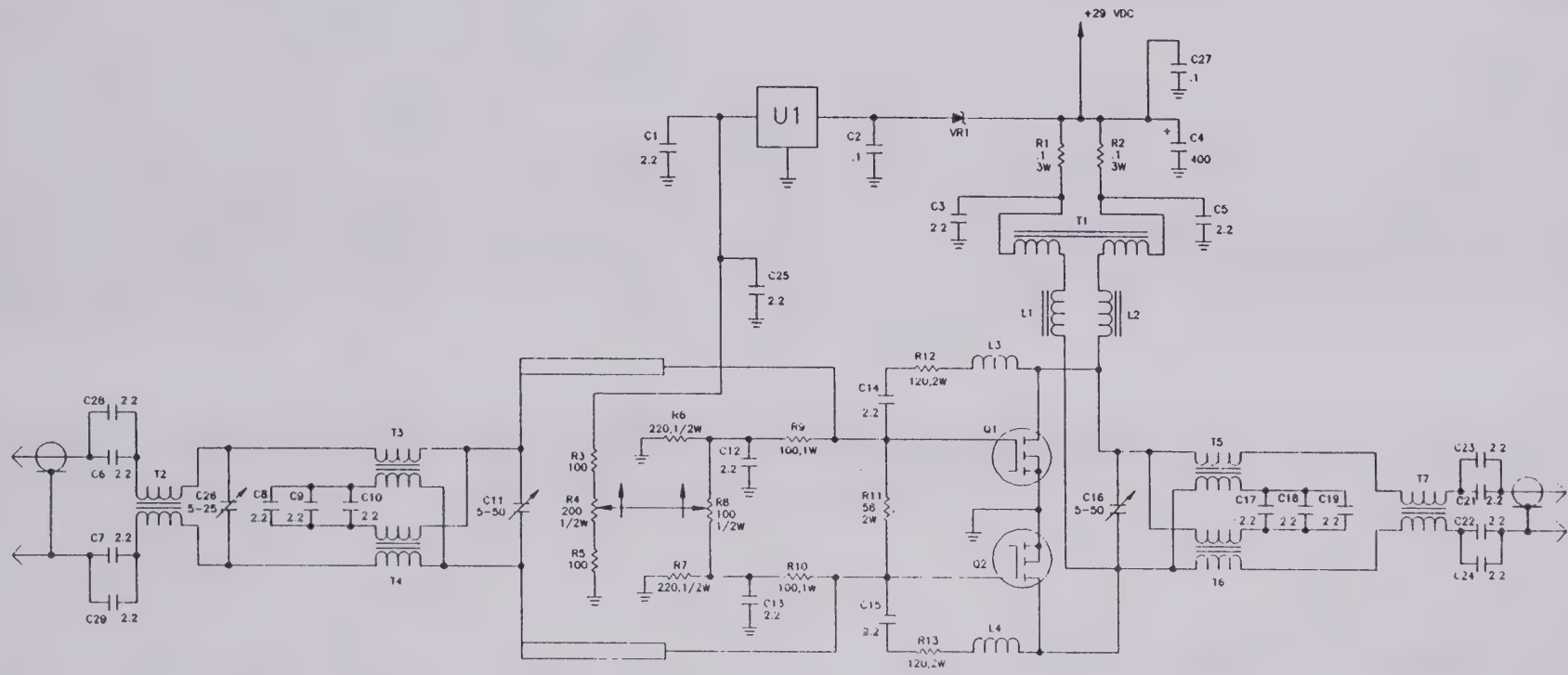
DRAWN	R. WALDRON 8/28/92
CHKD	G. BARTH 7/16/92
MECH	J. MACINN 10/14/92
ELEC	M. WOLFGANG 8/5/92
USED ON MODEL	1604520

SCHEMATIC DIAG
RF DRIVER

DWG. NO. 1006102

SCALE 1/1 SHEET 1 OF 1 REV. —

ECN	DATE	REV
—	10/16/91	1
—	9/9/92	—
7097	8/18/93	A
7633	11/10/94	B



NOTES
1.0 UNLESS OTHERWISE SPECIFIED:
RESISTOR VALUES ARE OHMS
RESISTOR RATINGS ARE 1/4 WATT
CAPACITOR VALUES ARE MICROFARADS

REFERENCE DESIGNATORS LAST USED	REFERENCE DESIGNATORS NOT USED
C29	C20
L4	
R13	
T7	
U1	
VR1	
Q2	

QTY REQD.	ITEM	PART NO	DESCRIPTION	MARK	FIN	MATL
		PARTS LIST				

UNLESS OTHERWISE SPECIFIED DO NOT SCALE DRAWING DIMENSIONS ARE IN INCHES AND INCLUDE PLATING THICKNESS ALL THREADS ARE UNIFIED NATIONAL SERIES, CLASS 2 REMOVE ALL BURRS AND SHARP EDGES

BASIC DIMENSIONS	2 PLACE DECIMALS	3 PLACE DECIMALS
TAP 1-56	± .02	± .005
NUMS. # 10-24	± .03	± .010
OVER 1	± .06	± .015

DRAWN	R. MALINOWSKI
DATE	10/16/91
CHKD	M WOLFGANG
DATE	7/22/92
MECH	J. MAGINN
DATE	10/14/92
ELEC	M HALL

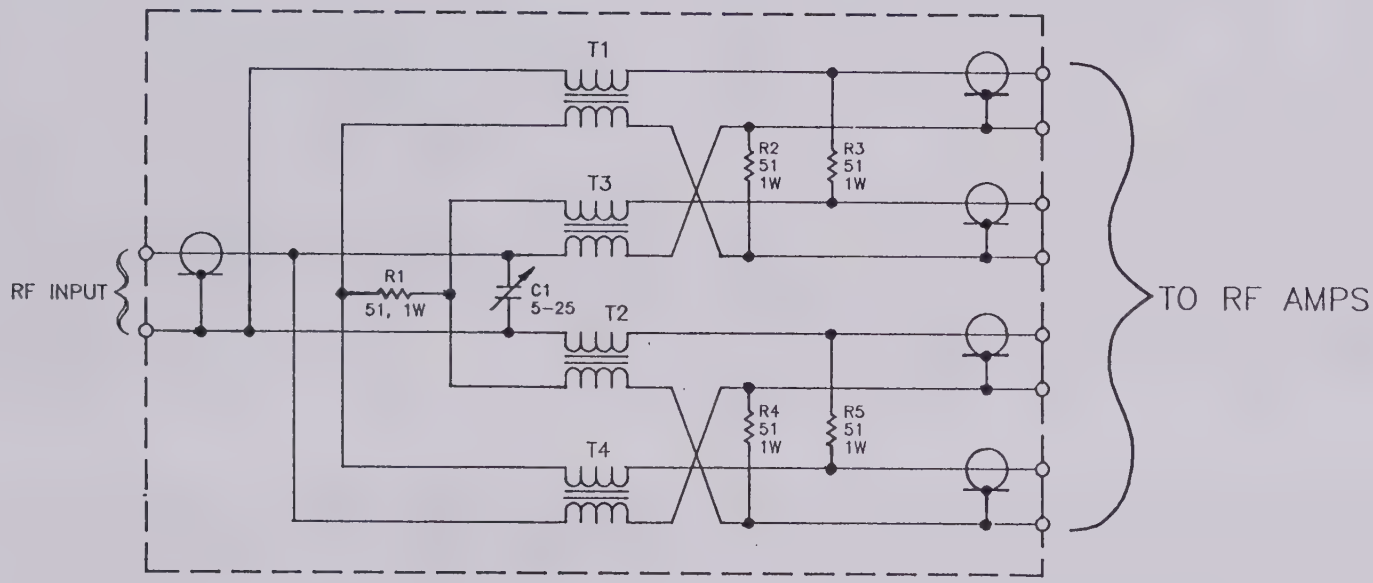
AMPLIFIER RESEARCH

SCHEMATIC DIAG
RF ASSY

DWG NO 1005598

SCALE — SHEET — OF — REV —

150A220
USED ON



ECN	DATE	REV
–	2/12/92	1
–	9/9/92	–

NOTES:
1.0 ALL RESISTOR VALUES ARE IN OHMS
2.0 ALL CAPACITOR VALUES ARE IN MICROFARADS

ITEM	QTY. REQD.	PART NO.	DESCRIPTION	MARK	FIN	MATL
		PARTS LIST				

UNLESS OTHERWISE SPECIFIED
DO NOT SCALE DRAWING
DIMENSIONS ARE IN INCHES AND INCLUDE PLATING THICKNESS
ALL THREADS ARE UNIFIED NATIONAL SERIES CLASS 2
REMOVE ALL BURRS AND SHARP EDGES

BASIC DIMENSIONS	2 PLACE DECIMALS	3 PLACE DECIMALS
UP TO 6	± .02	± .005
ABOVE 6 TO 24	± .03	± .010
ABOVE 24	± .08	± .015

ANGULAR DIMENSIONS ½°

150A220
USED ON MODEL

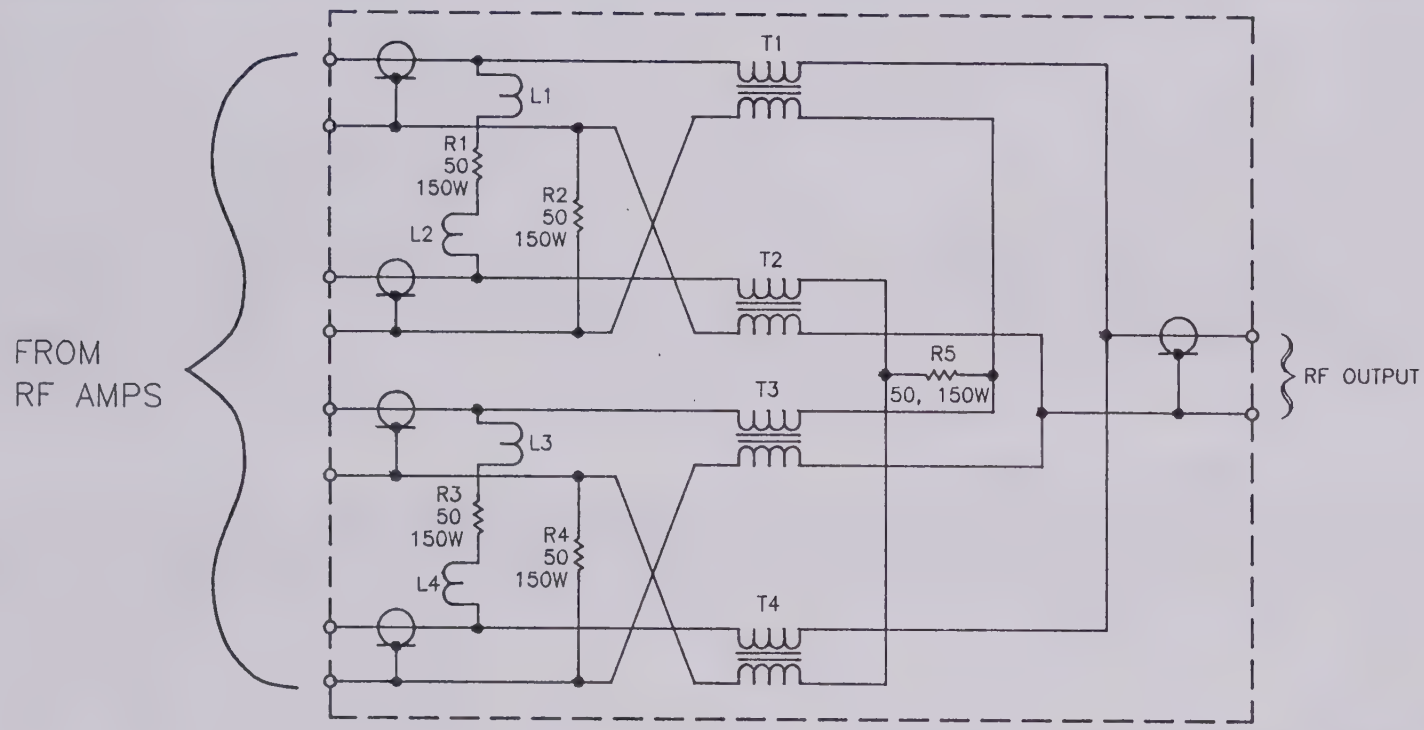
DRAWN R MALINOWSKI DATE 2/12/92
CHKD G. BARTH DATE 2/12/92
MECH J. MAGINN DATE 10/14/92
ELEC M. HALL DATE 2/12/92

AMPLIFIER RESEARCH

SCHEMATIC DIAG
SPLITTER

DWG. NO. 1005581

SCALE – | SHEET 1 OF 1 | REV. –



ECN	DATE	REV
–	3/11/92	1
–	9/9/92	–

REFERENCE DESIGNATIONS
LAST USED

L4
R5
T4

NOTES:
1.0 RESISTOR VALUES ARE IN OHMS
2.0 CAPACITOR VALUES ARE IN MICROFARADS

QTY. REQD.	ITEM	PART NO.	DESCRIPTION	MARK	FIN	MATL
		PARTS LIST				

UNLESS OTHERWISE SPECIFIED
DO NOT SCALE DRAWING
DIMENSIONS ARE IN INCHES AND INCLUDE PLATING THICKNESS
ALL THREADS ARE UNIFIED NATIONAL SERIES CLASS 2
REMOVE ALL BURRS AND SHARP EDGES

BASIC DIMENSIONS	2 PLACE DECIMALS	3 PLACE DECIMALS
UP TO 6	± .02	± .005
ABOVE 6 TO 24	± .03	± .010
ABOVE 24	± .06	± .015

ANGULAR DIMENSIONS ½°

150A220
USED ON MODEL

DRAWN R MALINOWSKI DATE 3/11/92
CHKD G. BARTH DATE 3/13/92
MECH J. MAGINN DATE 10/14/92
ELEC M. HALL DATE 3/13/92

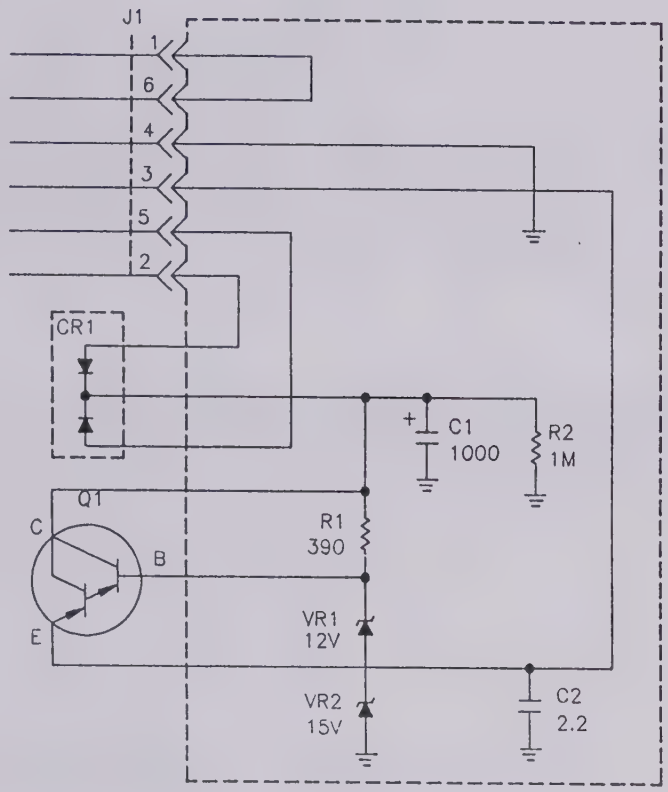
AMPLIFIER RESEARCH

SCHEMATIC DIAG
COMBINER

DWG. NO. 1005572

SCALE – SHEET 1 OF 1 REV. –

ECN	DATE	REV
—	2/7/92	1
—	9/10/92	—
7096	8/18/93	A



NOTES:
1.0 UNLESS OTHERWISE SPECIFIED:
RESISTOR VALUES ARE OHMS
RESISTOR RATINGS ARE 1/4 WATT
CAPACITOR VALUES ARE MICROFARADS

REFERENCE DESIGNATORS	
LAST USED	NOT USED
C2	
CR1	
J1	
Q1	
R2	
VR2	

ITEM QTY. REQD.	PART NO.	DESCRIPTION	MARK	FIN	MATL
	PARTS LIST				

UNLESS OTHERWISE SPECIFIED
DO NOT SCALE DRAWING
DIMENSIONS ARE IN INCHES AND INCLUDE PLATING THICKNESS
ALL THREADS ARE UNIFIED NATIONAL SERIES CLASS 2
REMOVE ALL BURRS AND SHARP EDGES

BASIC DIMENSIONS	2 PLACE DECIMALS	3 PLACE DECIMALS
UP TO 6	± .02	± .005
ABOVE 6 TO 24	± .03	± .010
ABOVE 24	± .08	± .015

ANGULAR DIMENSIONS ½°

150A220
USED ON MODEL

DRAWN R MALINOWSKI DATE 2/7/92
CHKD G. BARTH DATE 2/7/92
MECH R. LUBRANO DATE 2/7/92
ELEC M. HALL DATE 2/7/92

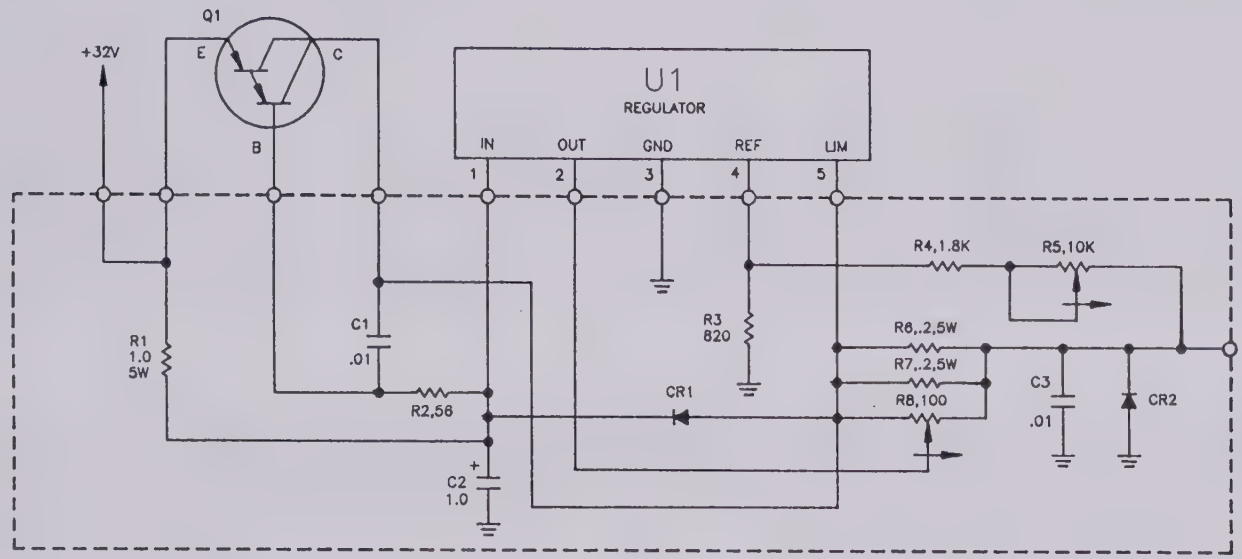
AMPLIFIER RESEARCH

SCHEMATIC DIAG
POWER SUPPLY, 24VDC

DWG. NO. 1005781

SCALE — SHEET 1 OF 1 REV. A

ECN	DATE	REV
—	10/16/91	1
—	9/9/92	—



NOTES:
1.0 UNLESS OTHERWISE SPECIFIED:
RESISTOR VALUES ARE OHMS
RESISTOR RATINGS ARE 1/4 WATT
CAPACITOR VALUES ARE MICROFARADS

REFERENCE DESIGNATIONS	
LAST USED	NOT USED
C3	
CR2	
Q1	
R8	
U1	

ITEM	QTY. REQD.	PART NO.	DESCRIPTION	MARK	FIN	MATL
		PARTS LIST				

UNLESS OTHERWISE SPECIFIED
DO NOT SCALE DRAWING
DIMENSIONS ARE IN INCHES AND INCLUDE PLATING THICKNESS
ALL THREADS ARE UNIFIED NATIONAL SERIES, CLASS 2
REMOVE ALL BURRS AND SHARP EDGES

BASIC DIMENSIONS	2 PLACE DECIMALS	3 PLACE DECIMALS
UP TO 6	± .02	± .005
ABOVE 6 TO 24	± .03	± .010
ABOVE 24	± .06	± .015

ANGULAR DIMENSIONS ½°

150A220
USED ON MODEL

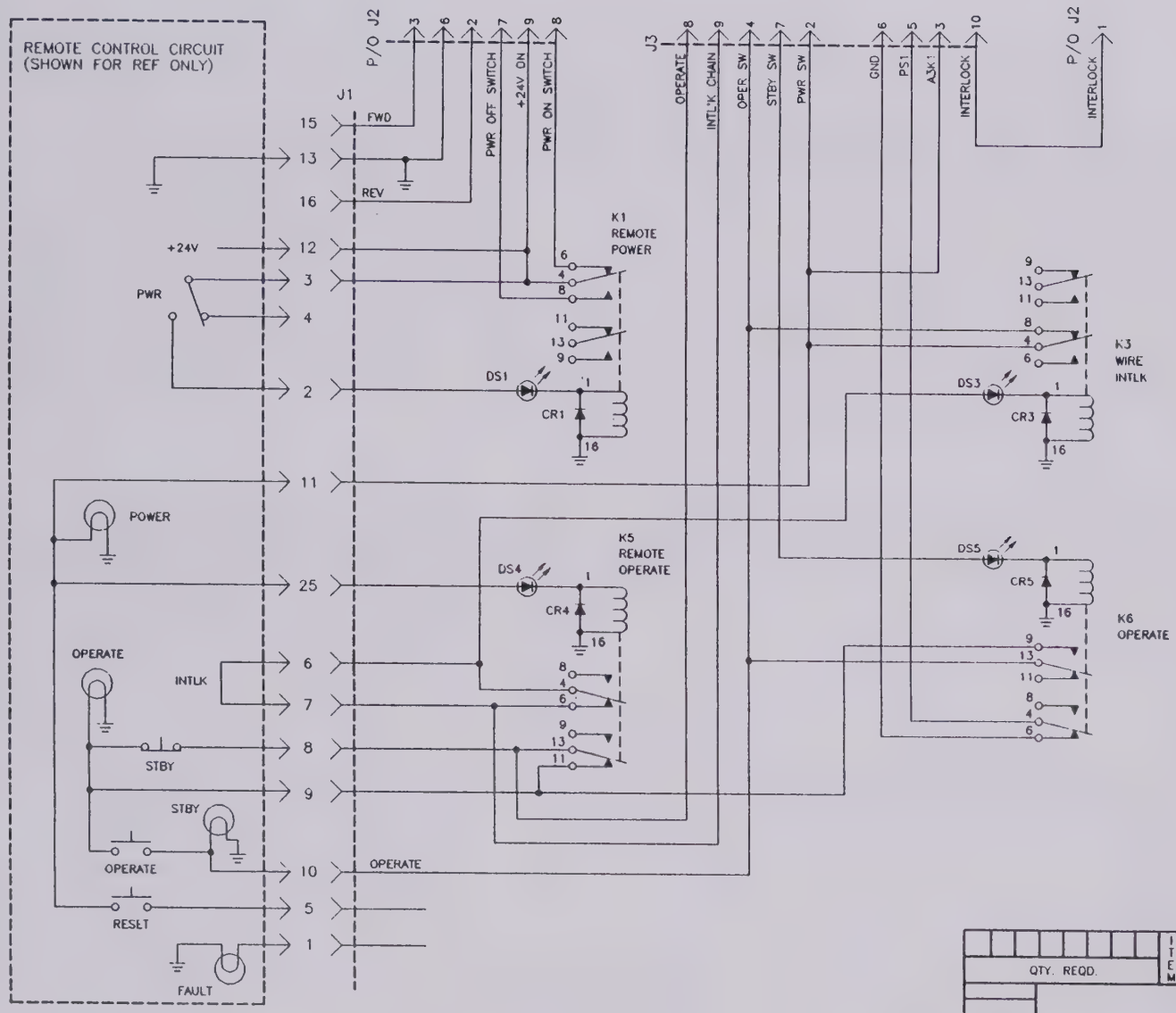
DRAWN R.MALINOWSKI DATE 10/16/91
CHKD G. BARTH DATE 10/16/91
MECH J. MAGINN DATE 10/14/92
ELEC M. HALL DATE 10/16/91

AMPLIFIER RESEARCH

SCHEMATIC DIAG
REGULATOR

DWG. NO. 1005613

SCALE — SHEET 1 OF 1 REV. —



ECN	DATE	REV
—	10/15/91	1
—	9/10/92	—

REFERENCE DESIGNATORS

LAST USED	NOT USED
CR5	CR2
DS5	DS2
J3	K2
K5	

ITEM	QTY. REQD.	PART NO.	DESCRIPTION	MARK	FIN	MATL
		PARTS LIST				

150A220
USED ON

DRAWN R.MALINOWSKI DATE 10/16/91
CHKD G. BARTH DATE 10/18/91
MECH J. MAGINN DATE 10/14/92
ELEC M. HALL

SCHEMATIC DIAG
OPERATE CIRCUIT

DWG. NO. 1005793

SCALE | SHEET 1 OF 1 | REV.

AMPLIFIER RESEARCH

MODEL NO. 150A220
SERIAL NO. 18780
TESTED BY [illegible]
DATE 7-8-96

TEST DATA SHEET

FREQ. (MHz)	POWER OUTPUT @ 1dB COMPRESSION (WATTS)	POWER OUTPUT SATURATED (WATTS) @ 0dBm INPUT	HARMONIC DISTORTION dBc AT 150 WATT OUTPUT
0.01	192	186	20
0.05	206	300	28
0.1	212	302	28
0.5	225	309	28
1	229	316	28
5	226	317	25
10	226	313	28
50	189	276	28
75	202	272	28
100	240	300	32
125	250	306	42
150	226	303	48
200	169	254	48
220	172	255	40

GAIN 53 dB (10 Watt Output at 100 MHz)

FLATNESS ± .8 dB

OPEN TEST ✓ (√)

SHORT TEST ✓ (√)

STABILITY ✓ (√)

INPUT VSWR 1.5:1.0

TEST EQUIPMENT	S/N
SIGNAL GENERATOR	TEC-SG 1510
SWEEP GENERATOR	TEC-SW 1019
POWER METER	TEC-PM 1263
SPECTRUM ANALYZER	TEC-SP 1063
OSCILLOSCOPE	TEC-OS 1075
FIXED ATTEN.	TEC-AT 1311
FIXED ATTEN.	TEC-AT 1139

TEST EQUIPMENT CALIBRATED TO NATIONAL INSTITUTE OF STANDARDS & TECHNOLOGY. (NIST)

AMPLIFIER RESEARCH
In compliance to IEC 1010-1
Safety requirements of electrical equipment for laboratory use
Annex K

ROUTINE TESTS

Model : 150A220

Serial No. : 19780

Date : 7-3-96

Inspected By : [illegible]

Tests: For equipment with working voltage up to 300 V

Protective earth resistance	Limit	
Apply 25 amps between protective terminal and **ACCESSIBLE** parts. Record resistance.	≤ 0.1 ohms	.08 ohms

Mains circuit insulation	(Circle one)	(√)
Apply voltage from the mains input to chassis for a period of time greater than two (2) seconds. No arcing or breakdown should occur.	1350 VAC (1900 VDC)	✓

Floating input terminals	Record Voltage	(√)
Apply 1.5 times working voltage to floating input terminals, where applicable. No arcing or breakdown should occur.	—	

FORM 406 REV0496

													ECN		
								REF		100096	SCHEMATIC			A	?
														B	?
														C	?
														D	28 JUN 79
													536	E	1 MAR 83
													555	F	15 APR 83

509	508	507	506	505	504	503	502	501	ITEM OR SYMBOL	PART NO.	DESCRIPTION	VALUE	TOL	RATING	SPECIFICATION OR VENDOR
QUANTITY REQUIRED															
								1	L3	023-602X1-[illegible]-26-1-[illegible]	INDUCTOR, TOROID				AR
								1	L2	012-04-03R0-A03-26-2	INDUCTOR, AIR				AR
								1	L1	HAIRPIN BEND USING ENTIRE LEAD OF R5					
								1	J2	UG625B/U	CONN, COAX				ANY
								1	J1	UG625B/U	CONN, COAX				ANY
								1	C5	125L-020	CAP, FXD CER	.002μf		1.4KV	SPRAGUE
								1	C4	2222-801-96135	CAP, VAR	1-6 pF			MEPCO-ELECTRA
								1	C3	2222-801-96135	CAP, VAR	1-6 pF			MEPCO-ELECTRA
								1	C2	808-01006	CAP, VAR	5-50pF			MEPCO-ELECTRA
								1	C1	808-00016	CAP, VAR	2-18pF			MEPCO-ELECTRA

AMPLIFIER RESEARCH

APPROVED E.E.	DATE	APPROVED M.E.	DATE	ORIGINATOR DWRoth	DATE 15Sep78
TITLE GAIN EQUALIZER ASSY				DWG. NO. PL1000968	
				SHEET 2 OF	REV F

509	508	507	506	505	504	503	502	501	ITEM OR SYMBOL	PART NO.	DESCRIPTION	VALUE	TOL	RATING	SPECIFICATION OR VENDOR
QUANTITY REQUIRED															
									10						
									9						
									8						
									7						
									6						
									5						
									4						
								1	3	1417	TERMINAL				USECO
								1	2	1x2	DRAWN STEEL COVER				RANDOLPH CAN
								1	1	1x1x2	DRAWN STEEL CAN			2	RANDOLPH CAN
								1	R7		RES, FXD	75Ω	5%	1/4W	
								1	R6		RES, FXD, COMP	36Ω	5%	1/4 W	
								1	R5		RES, FXD, COMP	47Ω	5%	1/4 W	
								1	R4		RES, FXD, COMP	27Ω	5%	1/4 W	
								1	R3		RES, FXD, COMP	27Ω	5%	1/4 W	
								1	R2		RES, FXD, COMP	22Ω	5%	1/4 W	
								1	R1		RES, FXD, COMP	22Ω	5%	1/4 W	

AMPLIFIER RESEARCH

APPROVED E.E.	DATE	APPROVED M.E.	DATE
TITLE GAIN EQUALIZER ASSY			

ORIGINATOR DWROTH	DATE 15SEP78
DWG. NO. PL1000968	
SHEET 3 OF	REV F

QUANTITY REQUIRED										SHEET	REV.			ECN	REV.	DATE
509	508	507	506	505	504	503	502	501								
MODEL 5W1000 (OEM) (N)	MODEL 568	MODEL 40W1000 LO LVL/DRIVER (SMA) (OBSOLETE)	MODEL 40W1000/50W1000 FINAL (SMA)	MODEL W1000 LO LVL/DRIVER (SMA)(OBSOLETE)	MODEL 40W1000 PENULTIMATE (SMA)(OBSOLETE)	MODEL 10W1000 FINAL (SMA)	MODEL 10W1000 LO LVL/DRIVER (SMA)	MODEL 5W1000 (LAB) (N)		1001779		SCHEMATIC		—	—	17 MAY 82
—	—	REF	—	—	—	—	—	—		1001719		SCHEMATIC		429	A	14 JUNE 82
REF	REF	—	—	REF	REF	REF	REF	REF		1001633		SCHEMATIC		477	B	3 OCT 82
														511	C	28 DEC 82
														521	D	27 JAN 83
														536	E	8 MAR 83
														582	F	22 JUNE 83
														63A	G	16 JAN 84
														753	H	27 FEB 85
										15	B	NOT PART OF MANUAL		777	J	8 MAY 85
										14	—			855	K	6 SEP 85
										13	L			1039	L	6 OCT 86
										12	L					
										11	—					
										10	—					
										9	—					
										8	L					
										7	F					
										6	L					
										5	L					
										4	K					
										3	—					
										2	D					
										1	L					

AMPLIFIER RESEARCH	APPROVED E.E.	DATE	APPROVED M.E.	DATE	ORIGINATOR B. HOLSTEIN	DATE 4 OCT 85
	TITLE RF BOARD ASSY				DWG. NO. PL1001632	
					SHEET 1 OF 15	REV L

509	508	507	506	505	504	503	502	501	ITEM OR SYMBOL	PART NO.	DESCRIPTION	VALUE	TOL	RATING	SPECIFICATION OR VENDOR
QUANTITY REQUIRED															
1	1	1	1	1	1	1	1	1	A2C13	9371	CAP, VAR	1.5-4PF			JOHANSON
1	1	1	1	1	1	1	1	1	A2C12	VP12BY333K	CAP, FXD CER	.033μf			VITRAMON
1	1	1	1	1	1	1	1	1	A2C11	VP12BY333K	CAP, FXD CER	.033μf			VITRAMON
—	—	—	1	—	—	—	—	—	A2C10	C/M17AH100K500NT	CAP, FXD CER	10PF			DIELECTRIC LABS
1	1	1	—	1	1	1	1	1	A2C10	C/M17AH8R2K500NT	CAP, FXD CER	8.2PF			DIELECTRIC LABS
1	1	1	1	1	1	1	1	1	A2C9	9371	CAP, VAR	1.5-4PF			JOHANSON
1	1	1	1	1	1	1	1	1	A2C8	9371	CAP, VAR	1.5-4PF			JOHANSON
1	1	1	1	1	1	1	1	1	A2C7	VP12BY333K	CAP, FXD CER	.033μf			VITRAMON
1	1	1	1	1	1	1	1	1	A2C6	VP12BY333K	CAP, FXD CER	.033μf			VITRAMON
1	1	1	1	1	1	1	1	1	A2C5	5855-000-Y5U0-503Z	CAP, FXD CER	.05μf			ERIE
1	1	1	1	1	1	1	1	1	A2C4	5815-000-Y5U0-104Z	CAP, FXD CER	0.1μf		25V	ERIE
1	1	1	1	1	1	1	1	1	A2C3	196D685X9035KA1	CAP, FXD TANT	6.8μf		35V	SPRAGUE
1	1	1	1	1	1	1	1	1	A2C2	5815-000-Y5U0-104Z	CAP, FXD CER	0.1μf		25V	ERIE
1	1	1	—	1	—	—	1	1	A2C1	51-719-011 *	CAP, FEED-THRU				METUCHEN
1	—	—	—	—	—	—	—	—	A1	1000787-516	RF BOARD ASSY				AR
—	1	—	—	—	—	—	—	—	A1	1000787-515	RF BOARD ASSY				AR
—	—	1	—	1	—	—	1	1	A1	1000787-513	RF BOARD ASSY				AR

*** NO SUBSTITUTION**

AMPLIFIER RESEARCH

APPROVED E.E.	DATE	APPROVED M.E.	DATE	ORIGINATOR W.C. SPINDLER	DATE 17MAY82
TITLE RF BOARD ASSY				DWG. NO. PL1001632	
				SHEET 2 OF	REV L

509	508	507	506	505	504	503	502	501	ITEM OR SYMBOL	PART NO.	DESCRIPTION	VALUE	TOL	RATING	SPECIFICATION OR VENDOR
QUANTITY REQUIRED															
—	—	1	—	—	—	—	—	—	A2C23	VP12BY333K	CAP, FXD CER	.033μf			VITRAMON
—	—	1	—	—	—	—	—	—	A2C22	9371	CAP, VAR	1.5-4PF			JOHANSON
—	—	1	—	—	—	—	—	—	A2C21	VP12BY333K	CAP, FXD CER	.033μf			VITRAMON
—	—	1	—	—	—	—	—	—	A2C20	VP12BY333K	CAP, FXD CER	.033μf			VITRAMON
1	1	1	1	1	1	1	1	1	A2C19	5815-000-Y5U0-104Z	CAP, FXD CER	0.1μf		25V	ERIE
1	1	1	1	1	1	1	1	1	A2C18	196D685X9035KA1	CAP, FXD TANT	6.8μf		35V	SPRAGUE
1	1	1	1	1	1	1	1	1	A2C17	5815-000-Y5U0-104Z	CAP, FXD CER	0.1μf		25V	ERIE
1	1	1	1	1	1	1	1	1	A2C16	5855-000-Y5U0-503Z	CAP, FXD CER	.05μf		25V	ERIE
1	1	1	1	1	1	1	1	1	A2C15	VP12BY333K	CAP, FXD CER	.033μf			VITRAMON
1	1	1	1	1	1	1	1	1	A2C14	VP12BY333K	CAP, FXD CER	.033μf			VITRAMON

AMPLIFIER RESEARCH

APPROVED E.E.	DATE	APPROVED M.E.	DATE	ORIGINATOR W.C. SPINDLER	DATE 17 MAY 82
TITLE RF BOARD ASSY				DWG. NO. PL1001632	
				SHEET 3 OF	REV —

509	508	507	506	505	504	503	502	501	ITEM OR SYMBOL	PART NO.	DESCRIPTION	VALUE	TOL	RATING	SPECIFICATION OR VENDOR
QUANTITY REQUIRED															
—	—	—	1	—	1	1	—	—	A2J5	1000643-101	CORE, FERRITE				AR
—	—	—	12"	—	8½"	10"	—	—	A2J5	RG-188A/U	CABLE, COAX				ANY
—	—	—	1	—	1	1	—	—	A2J5	142-0221-006	CONN, COAX	SMA			E.F. JOHNSON
1	1	1	1	1	1	1	1	1	A2J4	9002	PIN, JACK				AFE
1	1	1	—	1	—	—	1	1	A2J3	9002	PIN, JACK				AFE
—	—	—	—	—	1	—	—	—	A2J2	142-0233-006	CONN, BULKHEAD	SMA			E.F. JOHNSON
—	—	—	1	—	—	1	—	—	A2J2	142-0221-006	CONN, COAX	SMA			E.F. JOHNSON
—	10"	8½"	—	8½"	—	—	19"	—	A2J2	RG-142B/U	CABLE, COAX				ANY
—	—	1	—	1	—	—	1	—	A2J2	142-0261-006	CONN, COAX	SMA			E.F. JOHNSON
1	—	—	1	—	1	1	—	1	A2J2	1000643-622	CORE, FERRITE				AR
9"	—	—	—	—	—	—	—	9"	A2J2	LST-125	LOSSY LINE				CAPCON
9½"	—	—	12"	—	6"	10"	—	9½"	A2J2	RG-188A/U	CABLE, COAX				ANY
1	—	—	—	—	—	—	—	1	A2J2	N-F-21	CONN, COAX	"N"			COMPONENT ENTERPRISES
—	1	—	—	—	—	—	—	—	A2J2	UG-88/U	CONN, COAX	"BNC"			ANY
1	1	1	1	1	1	1	1	1	A2J1	9002	PIN JACK				AFE

AMPLIFIER RESEARCH

APPROVED E.E.	DATE	APPROVED M.E.	DATE	ORIGINATOR W. C. SPINDLER	DATE 17MAY82
TITLE RF BOARD ASSY				DWG. NO. PL1001632	
				SHEET 4 OF	REV K

509	508	507	506	505	504	503	502	501	ITEM OR SYMBOL	PART NO.	DESCRIPTION	VALUE	TOL	RATING	SPECIFICATION OR VENDOR
QUANTITY REQUIRED															
1	1	—	—	—	—	—	—	—	A2R3		RES, FXD	2.4K	5%	1/2W	A-B
1	1	—	—	—	—	—	—	—	A2R1	4539	RES, FXD, W.W.	2.4Ω		5W	OHMITE
1	1	1	1	1	1	1	1	1	A2R5		RES, FXD	1K	5%	1/4W	
1	1	1	1	1	1	1	1	1	A2R4		RES, FXD	220	5%	1/2W	A-B
—	—	1	1	1	1	1	1	1	A2R3		RES, FXD	4.3K	5%	1/2W	A-B
1	1	1	1	1	1	1	1	1	A2R2		RES, FXD	270	5%	1/4W	
—	—	1	1	1	1	1	1	1	A2R1	4530 *	RES, FXD W.W.	1.0Ω		5W	OHMITE
1	1	—	1	—	—	1	—	—	A2Q2	1000034-151	TRANSISTOR				AR
1	1	1	1	1	1	1	1	1	A2Q3	MPS-U51A	TRANSISTOR				MOTOROLA
—	—	1	—	1	1	—	1	1	A2Q2	1000034-145	TRANSISTOR				AR
1	1	1	1	1	1	1	1	1	A2Q1	MPS-U51A	TRANSISTOR				MOTOROLA
1	1	1	1	1	1	1	1	1	A2L5	023-608X1-20-26-1-1	INDUCTOR, TOROID				AR
1	1	1	1	1	1	1	1	1	A2L4	AWG #26 MAG WIRE	INDUCTOR, AIR 1.00 LG				AR
1	1	1	1	1	1	1	1	1	A2L3	.100 W x .375 LG	INDUCTOR, RIBBON LEAD				AR
1	1	1	1	1	1	1	1	1	A2L2	AWG #26 MAG WIRE	INDUCTOR, AIR 1.00 LG				AR
1	1	1	1	1	1	1	1	1	A2L1	023-608X1-20-26-1-1	INDUCTOR, TOROID				AR

*** NO SUBSTITUTION**

AMPLIFIER RESEARCH

APPROVED E.E.	DATE	APPROVED M.E.	DATE
TITLE RF BOARD ASSY			

ORIGINATOR W.C. SPINDLER	DATE 17MAY82
DWG. NO. PL1001632	
SHEET 5 OF	REV L

509	508	507	506	505	504	503	502	501	ITEM OR SYMBOL	PART NO.	DESCRIPTION	VALUE	TOL	RATING	SPECIFICATION OR VENDOR
QUANTITY REQUIRED															
2¼"	2¼"	—	2¼"	2¼"	2¼"	2¼"	2¼"	2¼"	T2	DA25038	COAX, SEMI-RIGID	25Ω			PRECISION TUBE
3	3	8	3	3	3	3	3	3	T2	1000634-402	FERRITE CORE				AR
5"	5"	5"	1¾"	5"	5"	5"	5"	5"	T1	UT47	COAX, SEMI-RIGID	50Ω			UNIFORM TUBE
6	6	6	2	6	6	6	6	6	T1	1000634-402	FERRITE CORE				AR
1	1	—	—	—	—	—	—	—	A2R12	4539	RES, FXD W.W.	2.4Ω		5W	OHMITE
—	—	1	1	1	1	1	1	1	A2R12	4530 *	RES, FXD W.W.	1.0Ω		5W	OHMITE
1	1	1	1	1	1	1	1	1	A2R11		RES, FXD	270	5%	¼W	
1	1	—	—	—	—	—	—	—	A2R10		RES. FXD	2.4K	5%	½W	A-B
—	—	1	1	1	1	1	1	1	A2R10		RES, FXD	4.3K	5%	½W	A-B
1	1	1	1	1	1	1	1	1	A2R9		RES, FXD	220	5%	½W	A-B
1	1	1	1	1	1	1	1	1	A2R8		RES, FXD	1K	5%	¼W	
1	1	1	1	1	1	1	1	1	A2R7		RES, FXD	220	5%	½W	A-B
1	1	1	1	1	1	1	1	1	A2R6		RES, FXD	220	5%	½W	A-B

*** NO SUBSTITUTION**

AMPLIFIER RESEARCH

APPROVED E.E.	DATE	APPROVED M.E.	DATE
TITLE RF BOARD ASSY			

ORIGINATOR W.C. SPINDLER	DATE 17MAY82
DWG. NO. PL1001632	
SHEET 6 OF .	REV L

509	508	507	506	505	504	503	502	501	ITEM OR SYMBOL	PART NO.	DESCRIPTION	VALUE	TOL	RATING	SPECIFICATION OR VENDOR
QUANTITY REQUIRED															
									20						
									19						
8	8	8	-	8	-	-	8	8	18	S-783-M01-F05A-G	WASHER, .312 O.D. x .141 I.D. x .093 THK				UNICORP <3
									17						
									16						
									15						
4	4	4	-	4	-	-	4	4	14		WASHER, .312 O.D. x .164 I.D. x .060 THK				AR <2
									13						
									12						
									11						
-	-	-	-	-	-	-	-	-	10	TXBF-032-025B	HEAT SINK				IERC
									9						
1	1	1	-	1	-	-	1	1	8	1000966-103	SHIELD				AR
1	1	1	-	1	-	-	1	1	7	1000966-102	SHIELD				AR
4	4	4	-	4	-	-	4	4	6	1000966-101	SHIELD, END				AR
									5						
1	1	1	-	1	-	-	1	1	4	1000964-301	HEAT SINK				AR
-	-	-	-	-	-	-	-	-	3	1002301-101	HEAT SINK				AR
									2						
1	1	1	1	1	1	1	1	1	1	1001634-101	PRINTED WIRING BD				AR

AMPLIFIER RESEARCH

APPROVED E.E.	DATE	APPROVED M.E.	DATE	ORIGINATOR W. C. SPINDLER	DATE 17 MAY 82
TITLE RF BOARD ASSY				DWG. NO. PL1001632	
				SHEET 7 OF	REV F

								—		1001779	SCHEMATIC		ECN	REV.	DATE
								—		1001719	SCHEMATIC		477	B	8 OCT 82
								REF		1001633	SCHEMATIC				

SHEET	REV.	
15	B	NOT PART OF MANUAL
14	—	
13	L	
12	L	
11	—	
10	—	
9	—	
8	L	

MODEL 558

518	517	516	515	514	513	512	511	510
QUANTITY REQUIRED								

AMPLIFIER RESEARCH

APPROVED E.E.	DATE	APPROVED M.E.	DATE	ORIGINATOR B. HOLSTEIN	DATE 4 OCT 85
TITLE RF BOARD ASSY				DWG. NO. PL1001632	
				SHEET 8 OF	REV B

518	517	516	515	514	513	512	511	510	ITEM OR SYMBOL	PART NO.	DESCRIPTION	VALUE	TOL	RATING	SPECIFICATION OR VENDOR
QUANTITY REQUIRED															
								1	A2C13	9371	CAP, VAR	1.5-4PF			JOHANSON
								1	A2C12	VP12BY333K	CAP, FXD CER	.033μF			VITRAMON
								1	A2C11	VP12BY333K	CAP, FXD CER	.033μF			VITRAMON
								—	A2C10	CM17AH100K500NT	CAP, FXD CER	10 PF			DIELECTRIC LABS
								1	A2C10	CM17AH8R2K500NT	CAP, FXD CER	8.2 PF			DIELECTRIC LABS
								1	A2C9	9371	CAP, VAR	1.5-4PF			JOHANSON
								1	A2C8	9371	CAP, VAR	1.5-4PF			JOHANSON
								1	A2C7	VP12BY333K	CAP, FXD CER	.033μF			VITRAMON
								1	A2C6	VP12BY333K	CAP, FXD CER	.033μF			VITRAMON
								1	A2C5	5855-000-Y5U0-503Z	CAP, FXD CER	.05μF			ERIE
								1	A2C4	5815-000-Y5U0-104Z	CAP, FXD CER	0.1μF		25V	ERIE
								1	A2C3	196D685X9035KA1	CAP, FXD TANT	6.8μF		35V	SPRAGUE
								1	A2C2	5815-000-Y5U0-104Z	CAP, FXD CER	0.1μF		25V	ERIE
								1	A2C1	51-719-011 *	CAP, FEED THRU				TEXAS SPECTRUM
								—	A1	1000787-516	RF BOARD ASSY				AR
								1	A1	1000787-515	RF BOARD ASSY				AR
								—	A1	1000787-513	RF BOARD ASSY				AR

*** NO SUBSTITUTION**

AMPLIFIER RESEARCH

APPROVED E.E.	DATE	APPROVED M.E.	DATE
TITLE RF BOARD ASSY			

ORIGINATOR B. HOLSTEIN	DATE 4 OCT 85
DWG. NO. PL1001632	
SHEET 9 OF	REV —

518	517	516	515	514	513	512	511	510	ITEM OR SYMBOL	PART NO.	DESCRIPTION	VALUE	TOL	RATING	SPECIFICATION OR VENDOR
QUANTITY REQUIRED															
								—	A2C23	VP12BY333K	CAP, FXD, CER	.033 μF			VITRAMON
								—	A2C22	9371	CAP, VAR	1.5-4PF			JOHANSON
								—	A2C21	VP12BY333K	CAP, FXD, CER	.033 μF			VITRAMON
								—	A2C20	VP12BY333K	CAP, FXD CER	.033 μF			VITRAMON
								1	A2C19	5815-000-Y5U0-104Z	CAP, FXD CER	0.1 μF		25V	ERIE
								1	A2C18	196D685X9035KA1	CAP, FXD TANT	6.8 μF		35V	SPRAGUE
								1	A2C17	5815-000-Y5U0-104Z	CAP, FXD CER	0.1 μF		25V	ERIE
								1	A2C16	5855-000-Y5U0-503Z	CAP, FXD CER	.05 μF		25V	ERIE
								1	A2C15	VP12BY333K	CAP, FXD CER	.033 μF			VITRAMON
								1	A2C14	VP12BY333K	CAP, FXD CER	.033 μF			VITRAMON

AMPLIFIER RESEARCH

APPROVED E.E.	DATE	APPROVED M.E.	DATE	ORIGINATOR B. HOLSTEIN	DATE 4 OCT 85
TITLE RF BOARD ASSY				DWG. NO. PL1001632	
				SHEET 10 OF	REV —

518	517	516	515	514	513	512	511	510	ITEM OR SYMBOL	PART NO.	DESCRIPTION	VALUE	TOL	RATING	SPECIFICATION OR VENDOR
QUANTITY REQUIRED															
								—	A2J5	1000643-101	CORE, FERRITE				AR
								—	A2J5	RG-188/U	CABLE, COAX				ANY
								—	A2J5	142-0221-006	CONN, COAX	SMA			E.F. JOHNSON
								1	A2J4	9002	PIN, JACK				AFE
								1	A2J3	9002	PIN, JACK				AFE
								—	A2J2	142-0233-006	CONN, BULKHEAD	SMA			E.F. JOHNSON
								—	A2J2	142-0221-006	CONN, COAX	SMA			E.F. JOHNSON
								10"	A2J2	RG-142B/U	CABLE, COAX				ANY
								—	A2J2	142-0261-006	CONN, COAX	SMA			E.F. JOHNSON
								—	A2J2	1000643-622	CORE, FERRITE				AR
								—	A2J2	LST-125	LOSSY LINE				CAPCON
								—	A2J2	RG-188A/U	CABLE, COAX				ANY
								—	A2J2	N-F-21	CONN, COAX	"N"			COMPONENT ENTERPRISES
								1	A2J2	UG-88/U	CONN, COAX	"BNC"			ANY
								1	A2J1	9002	PIN, JACK				AFE

AMPLIFIER RESEARCH

APPROVED E.E.	DATE	APPROVED M.E.	DATE
TITLE RF BOARD ASSY			

ORIGINATOR B. HOLSTEIN	DATE 4 OCT 85
DWG. NO. PL1001632	
SHEET 11 OF	REV —

518	517	516	515	514	513	512	511	510	ITEM OR SYMBOL	PART NO.	DESCRIPTION	VALUE	TOL	RATING	SPECIFICATION OR VENDOR
QUANTITY REQUIRED															
								1	A2R3		RES, FXD	2.4K	5%	1/2W	A-B
								1	A2R1	4539	RES, FXD, W.W.	2.4Ω		5W	OHMITE
								1	A2R5		RES, FXD	1K	5%	1/4W	
								1	A2R4		RES, FXD	220	5%	1/2W	A-B
								–	A2R3		RES, FXD	4.3K	5%	1/2W	A-B
								1	A2R2		RES, FXD	270	5%	1/4W	
								–	A2R1	4530 *	RES, FXD, W.W.	1.0Ω		5W	OHMITE
								1	A2Q2	1000034-151	TRANSISTOR				AR
								1	A2Q3	MPS-U51A	TRANSISTOR				MOTOROLA
								–	A2Q2	1000034-145	TRANSISTOR				AR
								1	A2Q1	MPS-U51A	TRANSISTOR				MOTOROLA
								1	A2L5	023-608X1-20-26-1-1	INDUCTOR, TOROID				AR
								1	A2L4	AWG#26 MAG WIRE	INDUCTOR, AIR 1.00LG				AR
								1	A2L3	.100 W x .375 LG	INDUCTOR, RIBBON	LEAD			AR
								1	A2L2	AWG#26 MAG WIRE	INDUCTOR, AIR 1.00LG				AR
								1	A2L1	023-608X1-20-26-1-1	INDUCTOR, TOROID				AR

*** NO SUBSTITUTION**

AMPLIFIER RESEARCH

APPROVED E.E.	DATE	APPROVED M.E.	DATE	ORIGINATOR B HOLSTEIN	DATE 7 OCT 85
TITLE RF BOARD ASSY				DWG. NO. PL1001632	
				SHEET 12 OF	REV L

518	517	516	515	514	513	512	511	510	ITEM OR SYMBOL	PART NO.	DESCRIPTION	VALUE	TOL	RATING	SPECIFICATION OR VENDOR
QUANTITY REQUIRED															
								2¼"	T2	DA25038	COAX, SEMI-RIGID	25Ω			PRECISION TUBE
								3	T2	1000634-402	FERRITE CORE				AR
								5"	T1	UT47	COAX, SEMI-RIGID	50Ω			UNIFORM TUBE
								6	T1	1000634-402	FERRITE CORE				AR
								1	A2R12	4539	RES, FXD, W.W.	2.4Ω		5W	OHMITE
								—	A2R12	4530 *	RES, FXD, W.W.	1.0Ω		5W	OHMITE
								1	A2R11		RES, FXD	270	5%	1/4W	
								1	A2R10		RES, FXD	2.4K	5%	1/2W	A-B
								—	A2R10		RES, FXD	4.3K	5%	1/2W	A-B
								1	A2R9		RES, FXD	220	5%	1/2W	A-B
								1	A2R8		RES, FXD	1K	5%	1/4W	
								1	A2R7		RES, FXD	220	5%	1/2W	A-B
								1	A2R6		RES, FXD	220	5%	1/2W	A-B

*** NO SUBSTITUTION**

AMPLIFIER RESEARCH

APPROVED E.E.	DATE	APPROVED M.E.	DATE
TITLE RF BOARD ASSY			

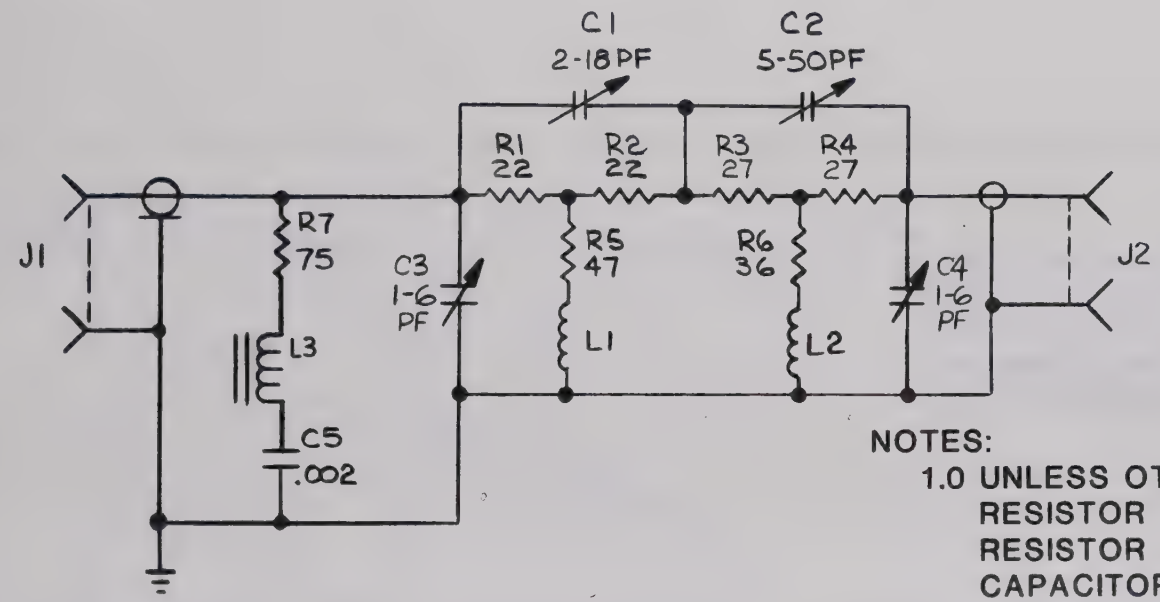
ORIGINATOR B. HOLSTEIN	DATE 7 OCT 85
DWG. NO. PL1001632	
SHEET 13 OF	REV L

518	517	516	515	514	513	512	511	510	ITEM OR SYMBOL	PART NO.	DESCRIPTION	VALUE	TOL	RATING	SPECIFICATION OR VENDOR
QUANTITY REQUIRED															
									20						
									19						
								8	18	S-783-M01-F05A-G	WASHER, .312 O.D. X .141 I.D. X .093 THK				UNICORP <3
									17						
									16						
									15						
								4	14		WASHER, .312 O.D. X .164 I.D. X .060 THK				AR <2
									13						
									12						
									11						
								–	10	TXBF-032-025B	HEATSINK				IERC
									9						
								1	8	1000966-103	SHIELD				AR
								1	7	1000966-102	SHIELD				AR
								4	6	1000966-101	SHIELD, END				AR
									5						
								–	4	1000964-301	HEATSINK				AR
								1	3	1002301-101	HEATSINK				AR
									2						
								1	1	1001634-101	PRINTED WIRING BD				AR

AMPLIFIER RESEARCH

APPROVED E.E.	DATE	APPROVED M.E.	DATE	ORIGINATOR B. HOLSTEIN	DATE 7 OCT 85
TITLE RF BOARD ASSY				DWG. NO. PL1001632	
				SHEET 14 OF	REV —

DATE	REV
18 NOV 77	A
17 MAR 78	B
15 SEP 78	C
28 JUL 79	D
1 Mar 83	E
15 Apr 83	F



NOTES:

1.0 UNLESS OTHERWISE SPECIFIED:
RESISTOR VALUES ARE OHMS
RESISTOR RATINGS ARE 1/4 WATT
CAPACITOR VALUES ARE MICRO FARADS

2.0 THIS SCHEMATIC MAY REPRESENT MULTIPLE ASSEMBLIES. SEE APPROPRIATE PARTS LIST FOR FINAL COMPONENT VALUES.

QTY. REQD.	ITEM	PART NO.	DESCRIPTION	MARK	FIN	MATL
		PARTS LIST				

REFERENCE DESIGNATIONS

LAST USED	NOT USED
C5	L3
J2	R7

10W1000

USED ON MODEL

UNLESS OTHERWISE SPECIFIED
DO NOT SCALE DRAWING.
DIMENSIONS ARE IN INCHES AND INCLUDE PLATING THICKNESS.
ALL THREADS ARE UNIFIED NATIONAL SERIES, CLASS 2.
REMOVE ALL BURRS AND SHARP EDGES.
TOLERANCE: ±.010.

DRAWN J. VOGENBERG
DATE 18 Nov 77
CHKD
DATE
MECH
DATE
ELEC
DATE

AMPLIFIER RESEARCH

SCHEMATIC DIAG. HIGHPASS FILTER

DWG. SCALE: NONE

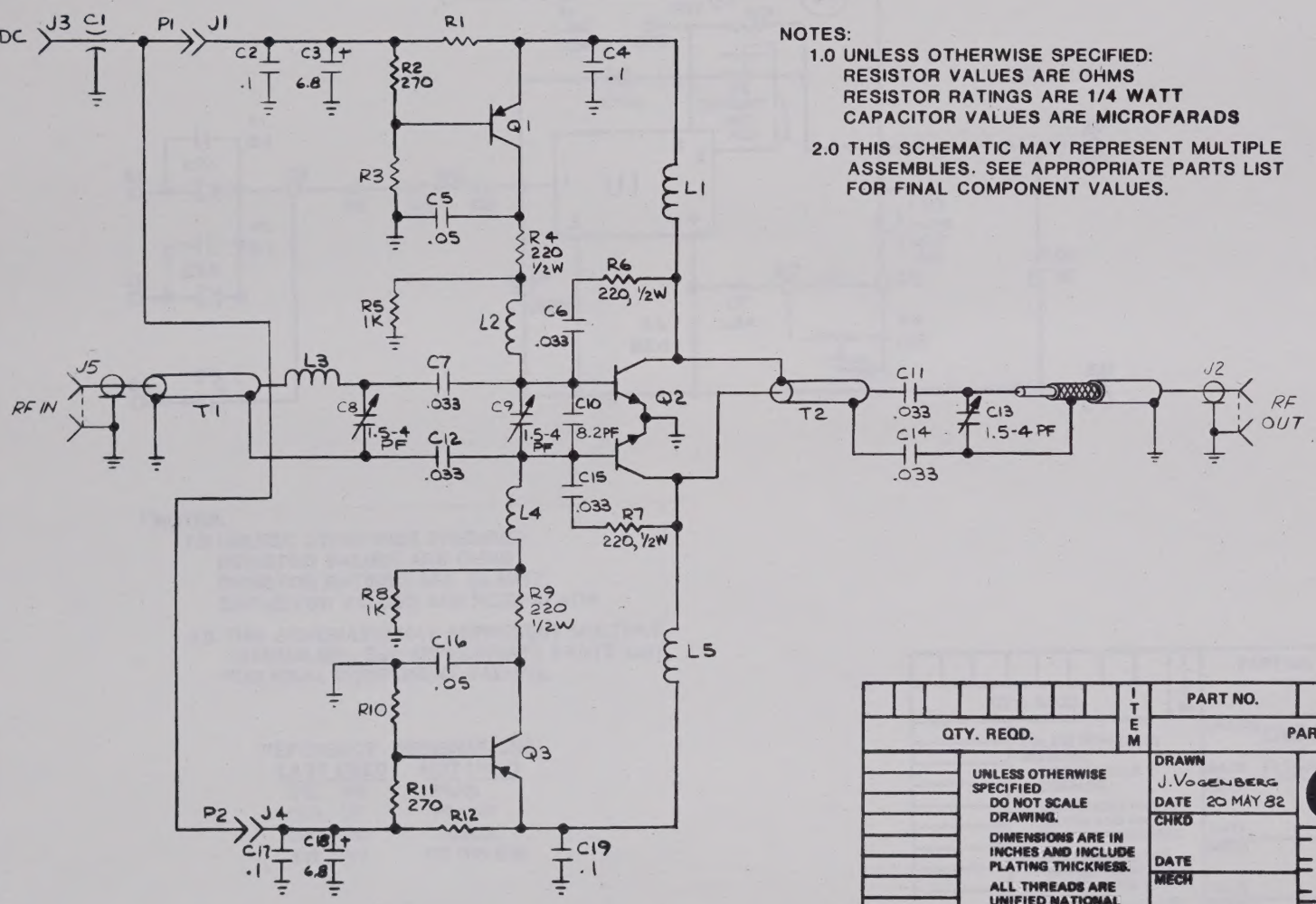
DWG. NO. 1000969

REV. F

SHEET 1 OF 1

FORM 118. REV0378

N57539 CENTENNIAL BLUEPRINT



NOTES:

1.0 UNLESS OTHERWISE SPECIFIED:
RESISTOR VALUES ARE OHMS
RESISTOR RATINGS ARE 1/4 WATT
CAPACITOR VALUES ARE MICROFARADS

2.0 THIS SCHEMATIC MAY REPRESENT MULTIPLE ASSEMBLIES. SEE APPROPRIATE PARTS LIST FOR FINAL COMPONENT VALUES.

DATE	REV
20 MAY 82	—
27 Jan 83	A
22 Jun 83	B
16 Jan 84	C

REFERENCE DESIGNATIONS

LAST USED	NOT USED
C19	Q3
J4	R12
L5	T2
P2	

QTY. REQD.	ITEM	PART NO.	DESCRIPTION	MARK	FIN	MATL
		PARTS LIST				

10W1000	
5W1000	
USED ON MODEL	

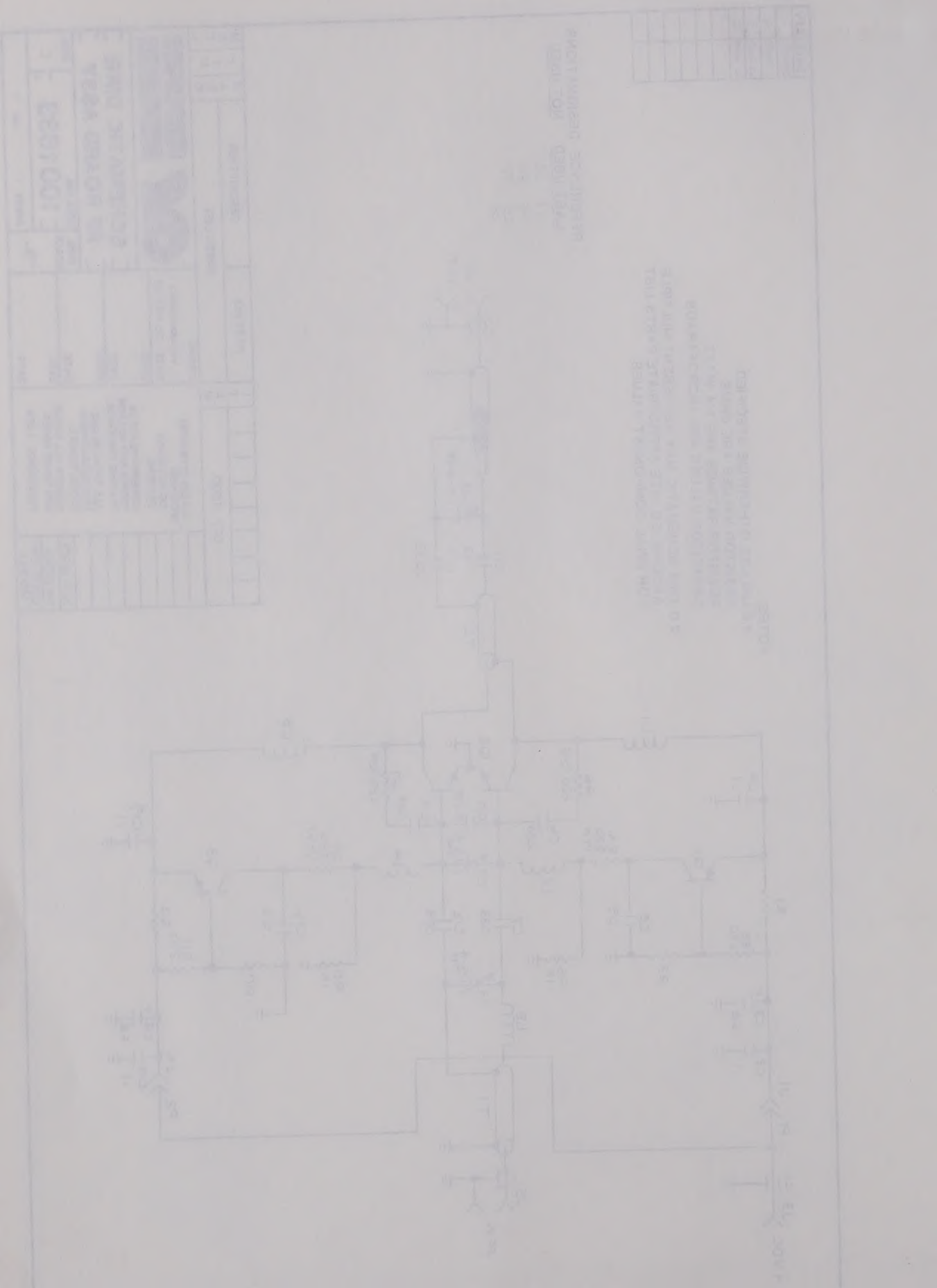
UNLESS OTHERWISE SPECIFIED
DO NOT SCALE DRAWING.
DIMENSIONS ARE IN INCHES AND INCLUDE PLATING THICKNESS.
ALL THREADS ARE UNIFIED NATIONAL SERIES, CLASS 2.
REMOVE ALL BURRS AND SHARP EDGES.
TOLERANCE: ±.010.

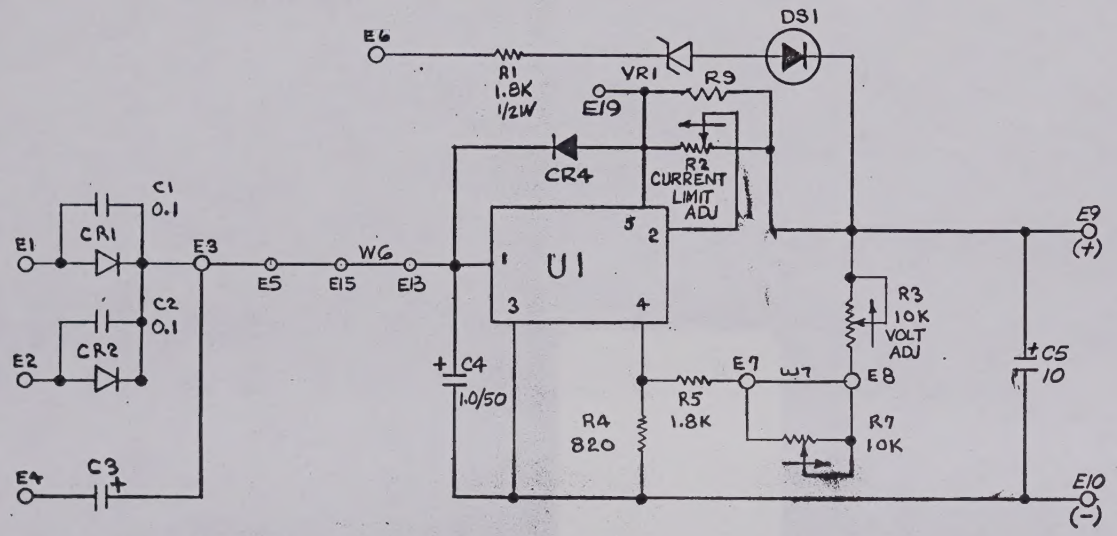
DRAWN J. VOGENBERG DATE 20 MAY 82
CHKD DATE
MECH DATE
ELEC DATE

AMPLIFIER RESEARCH

SCHEMATIC DIAG
RF BOARD ASSY

DWG. SCALE: NL
DWG. NO. 1001633
REV. C
SHEET 1 OF 1





DATE	REV
19JUN78	—
26JUN78	A
5/11/79	B
3SEP80	C
16JUN81	D
24AUG81	E
19OCT83	F
13AUG84	G
15MAR85	H
28AUG85	J
3JUL86	K

NOTES:

1.0 UNLESS OTHERWISE SPECIFIED:
RESISTOR VALUES ARE OHMS
RESISTOR RATINGS ARE 1/4 WATT
CAPACITOR VALUES ARE MICROFARADS

2.0 THIS SCHEMATIC MAY REPRESENT MULTIPLE ASSEMBLIES. SEE APPROPRIATE PARTS LIST FOR FINAL COMPONENT VALUES.

REFERENCE DESIGNATIONS

LAST USED		NOT USED
C5	R9	R6,R8
CR4	U1	W1-W5
DS1	VR1	CR3
E19	W7	E12 THRU E18

ITEM	QTY. REQD.	PART NO.	DESCRIPTION	MARK	FIN	MATL
		PARTS LIST				

UNLESS OTHERWISE SPECIFIED
DO NOT SCALE DRAWING.
DIMENSIONS ARE IN INCHES AND INCLUDE PLATING THICKNESS.
ALL THREADS ARE UNIFIED NATIONAL SERIES, CLASS 2.
REMOVE ALL BURRS AND SHARP EDGES.
TOLERANCE: ±.010.

GEN USE
USED ON MODEL

DRAWN DWRoth DATE 19Jun78
CHKD DATE
MECH DATE
ELEC DATE

AMPLIFIER RESEARCH

SCHEMATIC DIAG
REGULATOR MPLV

DWG. SCALE NONE
DWG. NO. 1001098
REV. K
SHEET 1 OF 1

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